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REPORT OF THE AGRICULTURAL RESEARCH INSTITUTE OF ONTARIO

Bowmanville, Ontario
April 1, 1990

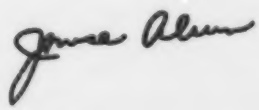
The Honourable David Ramsay
Minister of Agriculture and Food
Legislative Buildings
Toronto, Ontario
M7A 1A3

Dear Sir:

I have the honour to submit the twenty-seventh research *Report of the Agricultural Research Institute of Ontario* for the period April 1, 1989 to March 31, 1990.

The Institute wishes to express its sincere appreciation for the wholehearted cooperation of the administration and staff of the institutions at Alfred, Centralia, Guelph, Kemptville, New Liskeard, Ridgetown, Toronto, and Vineland in the planning and execution of research programs in agriculture, veterinary medicine, and consumer studies.

Respectfully submitted



J. Aluin
Chairman
Agricultural Research Institute of Ontario

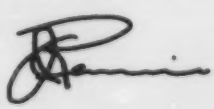
Toronto, Ontario
March 31, 1990

Dr. Janice Aluin, Chairman
Agricultural Research Institute of Ontario

Dear Madam:

I submit herewith a report of the Ontario Ministry of Agriculture and Food's research programs in agriculture, veterinary medicine, and consumer studies for the year ending March 31, 1990.

Respectfully submitted



J. C. Rennie
Director of Research
Agricultural Research Institute of Ontario

The Agricultural Research of Ontario Act passed by the Provincial legislature created the Institute in 1962 with the specific duties and responsibilities over the expenditure of the Ontario Ministry of Agriculture and Food's research funds for agriculture, veterinary medicine, and consumer studies. The ARIO meets every two months to review research programs, to inquire into whether or not they meet the needs of the industry, and to make recommendations to the Minister, where appropriate, on the expansion or reduction of programs and their human and physical resources.

The ARIO is composed largely of farmers and agribusiness people and its membership reflects the broadly based nature of Ontario's industry. The membership, of not more than fifteen, is appointed by the Lieutenant Governor in Council who also appoints the Director of Research from the Ministry.

Ten centres report to the ARIO: Agricultural Engineering Services, Agricultural Laboratory Services, Alfred College of Agriculture and Food Technology, Centralia College of Agricultural Technology, Economics and Policy Coordination Branch, Horticultural Research Institute of Ontario, Kemptville College of Agricultural Technology, New Liskeard College of Agricultural Technology, Ridgetown College of Agricultural Technology, and University of Guelph. The seven experimental stations, Alma, Arkell, Cambridge, Elora, Guelph, Ponsonby, and Woodstock, are managed by the University under contract with the Ministry.

Under the Act, the Institute may accept donations and grants of monies for research which are held in trust by the Director of Research and allocated for research in accordance with the terms of the funds. These funds are usually from commercial sources and are used for specific projects.

The ARIO is a unique corporate body responsible to the Minister of Agriculture and Food.

MEMBERS OF THE AGRICULTURAL RESEARCH INSTITUTE OF ONTARIO

Dr. J. Aluin, Chairman
Mr. W. Grieve, Vice-Chairman
Dr. J. C. Rennie, Director of Research
Ms. M. Toivonen, Comptroller
Mrs. C. Belluz
Mr. H. Brown
Mrs. L. Cohoe
Mrs. E. Hart
Mr. C. Hunter*
Dr. S. Leuty
Mr. J. McDougall
Dr. Y. Martel
Mr. B. Schubert
Mr. T. Smyth
Mr. G. Strang
Dr. P. Wall
Mrs. D. Whale

*Term of appointment expired before March 31, 1990.

REPORTING INSTITUTIONS

Agricultural Engineering Services **AES**
Centralia College of Agricultural Technology
Huron Park, Ontario
N0M 1Y0

Agricultural Laboratory Services **ALS**
Building 43, McGilvray Street
University of Guelph
Guelph, Ontario
N1G 2W1

Alfred College of Agriculture & Food Technology **ACAFT**
Collège de technologie agricole
et alimentaire d'Alfred
P.O. Box 580
Alfred, Ontario
K0B 1A0

Centralia College of Agricultural Technology **CCAT**
Huron Park, Ontario
N0M 1Y0

Economics and Policy Coordination Branch **EPC**
Ontario Ministry of Agriculture and Food
801 Bay Street, 4th Floor
Toronto, Ontario
M7A 2B2

Horticultural Research Institute of Ontario **HRIO**
Vineland Station, Ontario
L0R 2E0

Kemptville College of Agricultural Technology **KCAT**
Kemptville, Ontario
K0G 1J0

New Liskeard College of Agricultural Technology **NLCAT**
New Liskeard, Ontario
P0J 1P0

Ridgetown College of Agricultural Technology **RCAT**
Ridgetown, Ontario
N0P 2C0

University of Guelph **UG**
Guelph, Ontario
N1G 2W1

BUDGET

1989-1990 RESEARCH FUNDING	Ontario Government Funding $	ARIO Trust Fund (actual expenditure) $
Technology & Field Services	238,900.	----------
Education & Research Division	3,544,300.	----------
Agricultural Laboratory Services	750,000.	----------
Economics & Policy Coordination Branch	740,000.	----------
University of Guelph	26,254,000.	----------
Horticultural Research Institute of Ontario	4,306,800.	303,300.
Alfred College of Agriculture and Food Technology	63,700.	24,700.
Centralia College of Agricultural Technology	452,500.	99,100.
Kemptville College of Agricultural Technology	856,300.	16,600.
New Liskeard College of Agricultural Technology	1,265,000.	66,300.
Ridgetown College of Agricultural Technology	1,912,800.	327,000.
Ontario Crop Introduction & Expansion Program	388,700.	----------
Plant Industry Branch	----------	29,200.
Special ARIO Trust Funds		
Red Meat Research Plan	----------	895,200.
Ontario Pork Industry Improvement Plan	----------	1,703,400.
Agriculture & Food Research Program	----------	3,276,200.
Land Stewardship	----------	848,600.
Food Systems 2002	----------	636,500.
Red Meat II	----------	147,300.
TOTAL	**40,773,000.**	**8,075,700.**

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Chairman's Report

During the fiscal year 1989-90, the Agricultural Research Institute of Ontario reviewed a variety of research. In addition to the regular schedule of program reviews, the Institute members visited the University of Wisconsin to study their approach to research administration and evaluation.

Program Reviews

The members review a research program at least once every four years and either approve its continuation or ask for revisions in light of changing needs or circumstances. OMAF funded research programs both at the University of Guelph and at OMAF institutions are reviewed together to better assess the overall effect of the research funding on the agricultural and food industries. In 1989-90, the Institute reviewed ten programs. These were University of Guelph programs in bees and pollinators and equine research, along with OMAF and University of Guelph programs in economics, engineering, insect control and plant disease control. Of these programs, five were approved as presented, and five were approved at subsequent meetings after revisions were made to reflect the Institute's concerns.

Competitive Research

The Institute also reviewed and approved two competitive research program proposals namely: Food Quality and Safety Research and The Red Meat II Research Program. Regular reports were considered on the progress of the competitive research funded by other special ARIO research trust funds including Land Stewardship and Food Systems 2002.

Facility Tours

The Institute travelled to Wisconsin to meet with University and State government officials, producers and agribusiness leaders to learn about their research needs and the research mechanisms under another jurisdiction. Many similarities were identified in the type of agricultural industry and the problems facing farmers. Much new insight into alternative ways of identifying research needs, aligning research programs and administering finite human and financial resources was gained from discussions. Future deliberations on setting of research priorities will benefit greatly from this learning experience.

The Institute met at New Liskeard College of Agricultural Technology where members were given the opportunity to tour the facilities for research in the North as well as to visit several leading farms to view their operation and informally discuss the research issues facing the Northern Ontario farmer. The Institute toured the Guelph Equine Centre and met its research staff prior to the review of the equine program.

New Physical Facilities

Quality research requires the ongoing development of good research facilities. The Institute commends OMAF for the significant development of new physical facilities over the past year. These facilities include:

- **Alma Aquaculture Station**. The station is nearing completion. An endocrinology building, phase II water centre, standby generator, alarm and effluent systems still have to be finished.

Rapport du président

Au cours de l'exercice financier 1989-1990, l'Institut de recherche agricole de l'Ontario s'est penché sur de nombreux sujets de recherche. En plus du calendrier régulier des révisions du programme, les membres de l'Institut ont visité l'université du Wisconsin afin d'étudier leur mode d'administration et d'évaluation de la recherche.

Examen des programmes

Les membres revoient chaque programme de recherche au moins une fois aux quatre ans et ils en recommandent le maintien ou la révision selon les circonstances ou les nouveaux besoins. On examine ensemble les programmes de recherche financés par le MAAO, confiés à l'université de Guelph et aux institutions du MAAO, afin de mieux évaluer l'impact général du financement de la recherche sur les industries agricoles et alimentaires. En 1989-1990, l'Institut a examiné dix programmes. Il s'agissait de recherche menée par l'université de Guelph en apiculture, en pollinisation et en élevage de chevaux ainsi que d'autres programmes relevant du MAAO et de l'université de Guelph en matière d'économie, de génie, de répression des insectes et des maladies des plantes. Parmi ces programmes, cinq furent approuvés tels quels et les cinq autres, après avoir été modifiés pour répondre aux préoccupations de l'Institut.

Recherche concurrentielle

L'Institut a également examiné et approuvé deux propositions de programmes de recherche concurrentielle : le Programme de recherche sur la qualité et la sécurité des aliments et le Programme de recherche sur la viande rouge II. On a étudié les rapports réguliers concernant l'avancement de la recherche concurrentielle effectuée grâce à d'autres fonds spéciaux en fiducie de l'IRAO comme la gestion de terres et la production alimentaire 2002.

Tournée d'étude

L'Institut s'est rendu au Wisconsin pour rencontrer les représentants de l'université et du gouvernement de l'État, les producteurs et les leaders du monde agricole pour connaître leurs besoins et l'organisation de la recherche dans un autre milieu. De nombreuses similitudes furent identifiées dans le type d'industrie agricole et dans les problèmes auxquels font face les agriculteurs. Les rencontres ont révélé plusieurs nouvelles façons d'identifier les besoins en recherche, de diriger les programmes de recherche et d'administrer les ressources humaines et financières définies. Les prochaines discussions menant à l'établissement des priorités de la recherche bénéficieront grandement de cette expérience.

En réunion au Collège de technologie agricole de New Liskeard, les membres de l'Institut ont eu l'occasion de visiter les installations de recherche et plusieurs fermes importantes afin d'examiner leurs opérations et de discuter à titre informel des problèmes auxquels est confronté l'agriculteur du Nord de l'Ontario. L'Institut a visité le Centre équestre de Guelph et rencontré son personnel de recherche avant de passer en revue le programme équestre.

Nouvelles installations physiques

La qualité de la recherche repose sur le développement de bonnes installations de recherche. L'Institut fait l'éloge du MAAO pour l'aménagement important des nouvelles installations physiques au cours de la dernière année. Ces installations comprennent :

- **Arkell Research Station**. The new bull test barn and feed storage, replacing the ones lost several years ago by fire, have been completed. The sheep barn renovations are progressing well and the upgrading of the swine and poultry buildings to address animal care and human health and safety issues are being completed.
- **Elora Research Station**. A feed storage for the dairy heifer facility was finished early in 1990. Modifications to the former dairy heifer wing for embryo transfer research are underway. The manure storage in the dairy barn is being modified for dry handling as well as liquid storage. One hundred and thirty-five acres have been added to the holdings of the station.
- **Ponsonby Research Station**. Phase one dairy and sheep facilities for veterinary research are complete and plans are being drafted for the swine unit.
- **Guelph Research Station**. An equipment storage was constructed and planning is continuing for the Turfgrass Institute building.
- **Horticultural Research Institute of Ontario**. Two screenhouses at Vineland, started last year, have been completed.
- **Centralia College of Agricultural Technology**. A new agronomy building is now complete and fully operational.
- **Ridgetown College of Agricultural technology**. The new feed mill is complete and functional.
- **New Liskeard College of Agricultural Technology**. The research service buildings at Emo and Thunder Bay field stations are operational and the new arena and agronomy buildings on campus are nearly finished.

Thunder Bay research station.
Station de recherche de Thunder Bay.

Research Management

In 1988, OMAF signed the first bilateral agreement between a province and Agriculture Canada's Research Branch to divide the research responsibilities on tobacco and alternate crops between the Delhi Research Station and the Horticulture Experimental Station at Simcoe. In 1989, a similar agreement for horticulture was negotiated and is nearing completion. Other similar understandings for other areas of research are in various stages of development. These agreements are major steps in avoiding unnecessary

- **Station d'aquaculture d'Alma.** Sa construction est presque complétée. L'immeuble d'endocrinologie, le centre d'eau (phase II), la génératrice de réserve, ainsi que les systèmes d'alarme et d'effluent ne sont pas encore terminés.
- **Station de recherche d'Arkell.** Une nouvelle étable pour l'évaluation des taureaux et un entrepôt des aliments ont été érigés en remplacement de ceux détruits par un incendie il y a plusieurs années. Les rénovations de l'étable des moutons progressent bien et on a presque complété la mise à jour des porcheries et des poulaillers permettant l'étude des soins aux animaux, ainsi que de la santé et de la sécurité humaine.
- **Station de recherche d'Elora.** Au tout début de 1990, on a complété un entrepôt d'aliments relié au bâtiment des génisses laitières. On est en voie d'apporter des modifications au logement existant des génisses laitières pour y faire de la recherche sur le transfert des embryons. Les fosses de l'étable des vaches laitières sont modifiées pour l'entreposage du fumier sec ou liquide. Cinquante-cinq hectares ont été ajoutés à la superficie de la station.
- **Station de recherche de Ponsonby.** On a terminé la première phase de la construction des installations devant servir à la recherche vétérinaire pour les vaches laitières et pour moutons, et les plans des installations pour les porcs sont en voie d'être dressés.
- **Station de recherche de Guelph.** Un entrepôt pour l'équipement fut construit et la planification de l'aménagement de l'Institut du gazon se poursuit.
- **Institut de recherches horticoles de l'Ontario.** La construction de deux abris grillagés commencés à Vineland l'an dernier est maintenant terminée.
- **Collège de technologie agricole de Centralia.** Un nouvel établissement en agronomie est maintenant terminé et entièrement opérationnel.
- **Collège de technologie agricole de Ridgetown.** La nouvelle meunerie est complétée et fonctionnelle.
- **Collège de technologie agricole de New Liskeard.** L'immeuble du service de recherche à la station de Thunder Bay est opérationnel; le nouvel aréna et les établissements en agronomie sur le campus sont presque terminés.

Gestion de la recherche

En 1988, le MAAO a signé le premier accord bifatéral entre une province et la Direction de la recherche d'Agriculture Canada pour partager les responsabilités en matière de recherche sur le tabac et les récoltes alternatives entre la Station de recherche de Delhi et la Station expérimentale d'horticulture à Simcoe. Un accord semblable, négocié en 1989 pour l'horticulture, est presque conclu. Des ententes similaires portant sur d'autres domaines de recherche en sont à différentes étapes de développement. Ces accords constituent des mesures importantes permettant aux deux niveaux de gouvernement d'éviter la répétition inutile des efforts de recherche.

En novembre, l'université de Guelph a reçu un prix d'excellence du Ministre d'État, Sciences et Technologie, pour la mise au point d'un vaccin pour contrôler la fièvre du transport chez les bovins de boucherie. L'université et le MAAO ont conclu un accord avec une entreprise locale

duplication of research effort by the two levels of government.

In November the University of Guelph received a Canadian Award for Business Excellence from the Minister of State, Science and Technology, for the development of a vaccine for controlling shipping fever in beef cattle. The University and OMAF have an agreement with a local company for development for commercial use.

The Institute collects royalties on a number of technologies such as the Constant Head Wick Permeameter developed at Guelph, Presponse vaccine and the Mechanical Sow.

Research Priorities

Annually the Institute receives and reviews the research recommendations from the Ontario Agricultural Services Coordinating Committee and uses them as a base for setting ARIO priorities and in the review of research programs. The Institute considers that highest priority should be given to:

- **Optimum Economic Food Production and Processing**.
  It is essential that 'optimum economic yield' be the underlying premise of research relating primarily to food production, whether it be plant, animal, water and soil management, storage of products or food processing. This means optimizing the input/output relationship, to realize maximum economic rewards from what must be a world-competitive system.

- **Animal Care**.
  Most livestock producers practise good husbandry. However, new information is needed on conditions relative to animal behaviour and wellbeing, including housing, handling, treatment, transportation and slaughtering, and for the development of effective and realistic codes of practice.

- **Food Quality and Safety**.
  Consumers want assurance that all food products will be safe and of the highest possible quality. Effective methodologies and monitoring systems are needed to provide the level of assurance required. This relates to evaluation of the effectiveness and safety of food processes, pesticides, drugs and new products of biotechnology, to ensure high quality food of plant and animal origin.

- **Agriculture and the Environment**.
  Natural resources are of paramount importance for plants, animals and humans. Therefore, it is essential to conduct research which relates to improved soil and water management and conservation and to methods which prevent contamination of these resources, through effective, efficient and environmentally sensitive systems of byproduct utilization, in both the production and processing sectors of the industry.

The activities of the Institute are part of the challenging process of keeping Ontario producers and processors competitive in the world markets. It is important that agriculture and food research keep in tune with the changing need of the industry.

pour en réaliser l'application commerciale. L'Institut collecte les redevances sur un certain nombre de technologies comme le Constant Head Wick Permeameter mis au point à Guelph, le vaccin à effet et la truie mécanique.

Priorités de la recherche

Chaque année, l'Institut étudie les recommandations de recherche soumises par le Comité de coordination des services agricoles de l'Ontario. Ces recommandations aident l'IRAO à établir ses priorités et à réviser ses programmes de recherche. L'Institut considère que l'on doit accorder la plus haute priorité à :

- **L'optimisation économique de la production et de la transformation des aliments**
  Il est essentiel que le rendement économique optimal soit la prémisse de toute recherche portant sur la production des aliments, qu'il s'agisse de la gestion des plantes, des animaux, de l'eau et du sol, de l'entreposage des produits ou du traitement des aliments. Seule l'optimisation des entrées/sorties permettra de réaliser une rentabilité maximale dans le système qui se doit concurrentiel à l'échelle mondiale.

- **Soins aux animaux**
  La plupart des producteurs de bétail ont de bonnes pratiques d'élevage. Toutefois, on a besoin de renseignements additionnels sur les conditions relatives au comportement animal et au bien-être des animaux, y compris le logement, la manipulation, le traitement, le transport et l'abattage, et en ce qui concerne la mise au point des codes efficaces et réalistes de la pratique.

- **Qualité et innocuité des produits alimentaires**
  Les consommateurs exigent que tous les produits alimentaires soient sécuritaires et de la meilleure qualité. Ainsi, on doit disposer de méthodes et de techniques de contrôle efficaces pour satisfaire de telles exigences. Il faut évaluer l'efficacité et la sécurité des procédés de transformation des aliments, des pesticides, des médicaments et des nouveaux produits de la biotechnologie, pour s'assurer que les aliments d'origine végétale et animale soient de bonne qualité.

- **Agriculture et environnement**
  Les ressources naturelles sont de la plus haute importance pour les plantes, les animaux et les humains. Il est donc essentiel de mener des recherches portant sur l'amélioration du sol, la gestion et la conservation des eaux et les méthodes qui empêchent la contamination de ces ressources, par l'utilisation des sous-produits selon des modes à la fois efficaces et sensibles à l'environnement, tant dans le secteur de la production que dans celui du traitement.

Les activités de l'Institut souscrivent au défi visant à garder les producteurs et les transformateurs concurrentiels sur les marchés mondiaux. Il est important que l'agriculture et la recherche en alimentation soient compatibles avec les besoins changeants de l'industrie.

J. Aluin
Chairman
ARIO

Report of the Director of Research

All programs of research funded by the Ontario Ministry of Agriculture and Food come under the regular review of the ARIO. These research programs cover a broad range of commodities and disciplines and a spectrum of basic projects to those geared to specific applied problems. With over one thousand projects at nine main facilities, the programs are comprehensive, touching on most of the major issues and needs of the agrifood sector.

Research at OMAF funded institutions is an ongoing process with significant accomplishments arising out of most programs every year. To report in depth on the progress of every project would be impractical in this report. Detailed results of any project can be obtained by contacting the researcher directly. It is, however, appropriate to highlight a few of the more significant advances.

Livestock and Poultry Production

A major portion of the research effort and budget is devoted to animal research reflecting the size and importance of this segment of the industry to Ontario's agricultural economy.

- A new rapid test for infection with Bovine Leukaemia Virus has been developed and proven reliable in tests on more than 2000 milk samples. A recent development uses the same technology to test for antibodies against Infectious Bovine Rhinotracheitis Virus. The milk test eliminates the need for blood samples. **UG**
- Studies confirmed the sensitivity and specificity of a commercially available milk progesterone test to confirm cows in estrous. The test will assist in improving the efficiency of reproductive health management programs. **UG**
- A large project involving 300 Ontario beef herds has revealed that stillbirth rates among first calf heifers is three times that of mature dams. The attendance at calving of heifers is an important management tool to reduce these losses. **UG**
- The application of chronobiological techniques to control parturition in the dairy cow indicated that the light treatment had no effect on time of calving. Feeding the cows between 1900-2100h tended to increase the amount of morning calving. The results point towards a possible presence of a circadian rhythm of parturition in dairy cattle. **RCAT**
- A detailed study to evaluate the effect of heat-processed soybeans on carcasses in swine was completed. The carcasses were definitely softer than those from meal feedings but they did not seem to present difficulties during processing. Taste of the pork was not negatively affected by the use of the full-fat soybeans in grower-finisher diets. However, the paleness of the lean and the possible effect of the softer, greasier carcass fat on consumer acceptance is a concern. **RCAT**

Rapport du directeur de la recherche

Tous les programmes de recherche financés par le ministère de l'Agriculture et de l'Alimentation de l'Ontario font l'objet d'une révision régulière de l'IRAO. Ces programmes de recherche couvrent une vaste gamme de produits et de disciplines et un éventail de projets de recherche élémentaire ainsi que d'autres touchant à des problèmes spécifiques. Avec plus de 1 000 projets aux neuf installations principales, les programmes sont complets, touchant à la plupart des questions importantes et des besoins du secteur agro-alimentaire.

La recherche effectuée dans les institutions financées par le MAAO est un processus continu amenant chaque année d'importantes réalisations de la plupart des programmes. Il est impossible de mentionner dans le présent rapport le progrès accompli dans chaque projet. Pour chacun, on peut obtenir les résultats en détail en contactant directement le chercheur. Il convient toutefois de souligner quelques-uns des plus importants progrès accomplis.

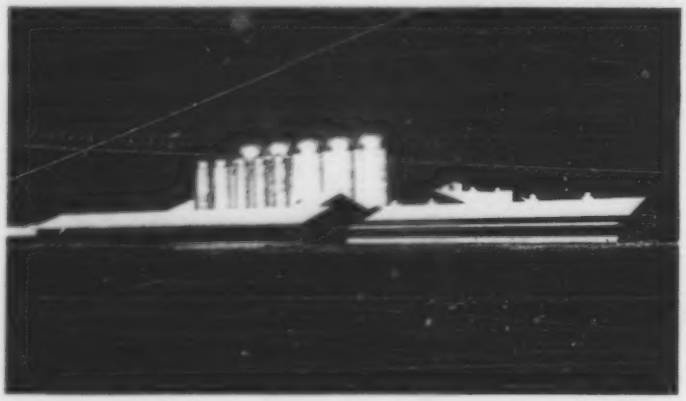
Élevage du bétail et de la volaille

Une partie importante des efforts et du budget en matière de recherche est consacrée à la recherche sur les animaux, reflétant ainsi la dimension et l'importance de cette partie de l'industrie sur l'économie agricole de l'Ontario.

- On a créé un nouveau test rapide pour dépister l'infection par le virus de la leucémie bovine. Ce test s'est avéré fiable lorsque mis à l'essai sur plus de 2 000 échantillons de lait. Une récente découverte utilise la même technologie pour déceler les anticorps contre le virus de la rhinotrachéite infectieuse des bovins. Le test du lait élimine la nécessité des échantillons de sang. **UG**
- Des études ont confirmé la sensibilité et la spécificité d'un test commercial de progestérone effectué sur le lait pour déceler les vaches en chaleur. Le test pourrait améliorer l'efficacité de la régie en reproduction animale. **UG**
- Un vaste projet portant sur 300 troupeaux de bovins de boucherie de l'Ontario a révélé que les vaches accusent, à leur premier vêlage, un taux de mortalité néonatale trois fois plus élevé que celui des vaches adultes. La présence de l'éleveur au vêlage est une pratique importante de gestion pour réduire ces pertes. **UG**
- L'application des techniques chronobiologiques pour contrôler le vêlage chez la vache laitière indique que l'éclairage n'a aucun effet sur le moment du vêlage. L'alimentation des vaches entre 19 h et 21 h semble augmenter la fréquence de vêlage le matin. Les résultats démontrent la présence possible d'un rythme circadien de la mise-bas chez les bovins laitier. **RCAT**
- On a complété une étude détaillée pour évaluer l'effet de l'alimentation aux graines de soya traitées à la chaleur sur les carcasses de porcs. Les carcasses étaient assurément moins fermes que celles produites par les aliments complets mais elles ne semblaient présenter aucune difficulté au traitement. Le goût du porc n'était pas affecté par l'utilisation des graines de soya à forte teneur en gras dans les régimes croissance-finition. Toutefois, la pâleur du maigre de la viande et l'amollissement possible du gras de la carcasse pourraient déplaire au consommateur. **RCAT**

- The cow/calf herd monitoring system, BEEFWATCH, was developed and made available to veterinarians and producers. In addition, all field data for examination of the productivity of the Ontario cow/calf herd have now been collected and are currently being analyzed. **UG**

- Le BEEFWATCH, système de contrôle des troupeaux de vaches nourricières, a été créé et rendu accessible aux vétérinaires et aux producteurs. De plus, toutes les données requises pour l'étude de la productivité des troupeaux de vaches nourricières de l'Ontario ont été recueillies et font actuellement l'objet d'analyses. **UG**



Overview of feedlots and feed storage at Elora Beef Cattle Research Centre.

Vue d'ensemble des parcs d'engraissement et entrepôts d'aliments pour le bétail à la station de recherche sur les bovins de boucherie d'Elora.

- An ELISA test has been developed to detect pleuropneumonia in swine. This respiratory disease is an economically important problem in the Ontario swine industry. The development of this assay will enable veterinarians to identify herds with carrier animals with no clinical signs of the disease and thereby limit the spread of the problem from herd to herd. **UG**

- Recent research has shown that not only humans suffer from heart and lung disease. Animals and birds are also affected. The studies indicate that this problem in chickens and turkeys may be related to their very rapid growth. Future work will concentrate on increasing lung capacity and identifying factors which affect oxygen demand. **UG**

- Mice are adopting horse cells to solve the problem of pneumonia in foals. Mice with a variety of defensive deficits have been tested for resistance to a serious bacterial killer of young foals. The absence of T lymphocytes, the critical cell lacking in human AIDS, resulted in pneumonia in the mice. Future work will focus on the transplant of equine blood cells into mice to further separate and identify resistance to pneumonia. **UG**

- Laboratory techniques have been improved to assist in the more accurate determination of gill disease in fish. These improved techniques will help increase the rate of progress in overcoming the diseases of most economical significance to the aquaculture industry. **UG**

- Alfalfa silage feeding was found to be effective in producing meat equal in tenderness to grain fed animals (although marbling was less) and superior to pasture fed animals. **UG**

- In dairy breeding research, gestation length was found to be highly heritable, the first report of this finding in the world, and opportunities for reduction in calving problems by selection for shorter gestation intervals appears promising. **UG**

- Researchers have developed a new device that can be used in the barn for monitoring the amount of immunoglobulin (IG) in a calf's blood. The new invention will enable the farmer to assess the colostrum manage-

- Un test ELISA a été mis en valeur pour détecter la pleuropneumonie chez le porc. Cette maladie respiratoire constitue un problème grave au point de vue économique dans l'industrie du porc de l'Ontario. La création de ce test permettra au vétérinaire d'identifier les troupeaux des animaux porteurs n'ayant aucun signe clinique et par le fait même limitera la transmission de la maladie d'un troupeau à l'autre. **UG**

- Une recherche récente a démontré qu'il n'y a pas que les humains qui souffrent de maladie cardiaque et pulmonaire. Les animaux et les oiseaux en sont également affectés. Selon les études, ce problème serait dû, chez les poulets et les dindes, à leur croissance très rapide. Les prochains travaux porteront spécialement sur l'augmentation de la capacité pulmonaire et sur l'identification des facteurs influant sur la demande d'oxygène. **UG**

- Les souris adoptent des cellules de cheval pour résoudre le problème de la pneumonie des poulains. On a étudié sur des souris dont les mécanismes de défense étaient déficients, leur résistance à un pathogène bactérien grave affectant les jeunes poulains. L'absence de lymphocytes T, cellules critiques détruites chez les sidatiques, s'est traduit par une pneumonie chez les souris. Les prochains travaux se porteront sur la transplantation de cellules sanguines de cheval sur les souris pour distinguer davantage et identifier la résistance à la pneumonie. **UG**

- Des techniques de laboratoire améliorées permettent de dépister plus précisément la maladie des branchies chez le poisson. Ces techniques aideront à augmenter le taux de réussite dans la lutte contre les maladies fort importantes au plan économique en aquaculture. **UG**

- L'ensilage de luzerne s'est révélé un aliment capable de donner une viande aussi tendre, bien que moins persillée, que les céréales et supérieure à celle produite sur pâturage. **UG**

- Dans la recherche en élevage des bovins laitiers, on a constaté que la durée de la gestation est dotée d'une forte héritabilité. Une telle découverte et les possibilités de réduction des problèmes de vêlage en choisissant des intervalles de gestation plus brefs semblent prometteurs. **UG**

ment program, reduce the need for antibiotics, and at the same time lower calf mortality rate. **KCAT**

- A linear model methodology has been extensively studied and applied to genetic evaluation of the dairy breeds. Industry is already applying this technology to give Canada a competitive edge in selection of bull dams. **UG**

- Extensive studies of feeding strategies to enhance rumen function and dairy productivity have revealed that early lactation hay feeding increases milk yield and total dry matter intake when cows are on an alfalfa and concentrate ration. **UG**

- There was no significant difference in growth rate to weaning of calves which were castrated within a couple of days after birth or 3 weeks prior to weaning. This means there is no advantage to leaving calves intact up until weaning. **NLCAT**

- A microcomputer program for estimation of breeding values of swine has been developed and implemented by the Ontario and Canadian Swine Industries. **UG**

- In an evaluation of electronic feeding of sows in groups, the environment was found to have a highly significant effect on levels of aggression, and decreased reproductive performance was observed. Providing a complex environment decreased aggression. **UG**

- Growth promotion of swine by immunizing them against their own somatostatin showed increased birth weight and early growth with decreased backfat and higher carcass index. **UG**

- Feeding broiler breeders every day at reduced rates proved to be superior than the industry practices of skip-a-day or ad libitum feeding. The advantage lies in reduced body maintenance costs. **UG**

- Les chercheurs ont mis au point un nouveau dispositif permettant de contrôler à l'étable la teneur du sang en immunoglobulines (IG) du veau. La nouvelle invention permettra à l'éleveur d'évaluer le programme d'alimentation au colostrum, de réduire le besoin d'antibiotiques et en même temps de diminuer le taux de mortalité chez le veau. **KCAT**

- On a beaucoup étudié une méthodologie de type linéaire et on l'a appliquée à l'évaluation génétique des races laitières. L'industrie utilise déjà cette technologie pour permettre au Canada d'être compétitif dans le choix des mères à taureaux. **UG**

- Des études approfondies des systèmes alimentaires susceptibles de relever la fonction du rumen et la productivité laitière ont révélé que l'alimentation au foin en début de lactation augmentait le rendement du lait et l'absorption globale de matière sèche lorsque les vaches reçoivent une ration de luzerne et de concentré. **UG**

- On n'a relevé aucune différence appréciable dans le taux de croissance jusqu'au sevrage des veaux castrés deux jours après la naissance ou trois semaines avant le sevrage. Cela signifie qu'il n'y a aucun avantage à laisser les veaux indemnes jusqu'au sevrage. **NLCAT**

- Les industries du porc de l'Ontario et du Canada ont élaboré et mis en application un programme micro-informatique permettant l'évaluation des valeurs d'élevage du porc. **UG**

- Lors d'une évaluation de l'alimentation électronique des truies en groupes, on a constaté que l'environnement avait un effet fort important, sur le niveau d'agression et entraînait la chute du rendement de la reproduction. Le fait d'assurer un environnement complexe a diminué l'agression. **UG**

- La promotion de la croissance des porcs en les immunisant contre leur propre somatostatine a laissé voir une augmentation du poids à la naissance et de la croissance précoce avec une chute de l'épaisseur du gras dorsal et une amélioration de l'indice de la carcasse. **UG**

- L'alimentation restreinte quotidienne des poulets de chair reproducteurs s'est avérée supérieure à celles pratiquées en alternance ("ski-a-day") ou à volonté. L'avantage repose sur la réduction des dépenses d'entretien. **UG**

Agricultural Engineering

Engineering research focused on livestock housing and the storage and utilization of crops and agricultural by-products.

- Density and pressure data were collected on whole plant barley silage in the summer of 1989 for moisture contents ranging from 36 to 63%. The results were used to produce a model of the dry density of barley silage in terms of vertical pressure, loading time and moisture content. These results will be coupled with indirect friction test results to predict capacities of concrete and steel tower silos at various moisture contents. **UG**

Génie agricole

La recherche technique s'est concentrée sur le logement du bétail, ainsi que sur l'entreposage et l'utilisation des récoltes et des sous-produits agricoles.

- Les données de densité et de compression furent recueillies sur l'ensilage d'orge entière au cours de l'été de 1989 pour une teneur en eau variant de 36 à 63%. On a utilisé les résultats pour produire un modèle de densité sèche de l'ensilage de l'orge en fonction de la compression verticale, du temps de chargement et de la teneur en eau. Ces résultats seront reliés aux résultats de tests de friction indirecte pour prédire les capacités des silos-tours de béton et d'acier à diverses teneurs en eau de l'ensilage. **UG**

- Considerable progress was made into the study of high wall bunker silos. The experimental results agree closely with the analytically predicted wall pressures. New design recommendations will be formulated following completion of a parametric study of loads from the compaction equipment. **UG**

- A number of 110° and 80° flat fan sprayer nozzles were tested for pressure and height of operation. Pressures of 100 kPa or lower were not considered satisfactory for sprayer use where an even pattern was expected. **RCAT**

- Dust level studies in swine barns are in progress. It has been found that winter levels are higher than summer but neither ventilation rate nor circulation rate of air within the building reduces the dust levels. Inlet air passing over insulation material did not have an increase in micro-organisms. This is good news to the many producers who draw ventilation air from the attic space. **UG**

- A project to produce guidelines for natural ventilation of swine buildings to be published by the Canadian Plan Service summarizes 5 years of research on environmental control, air quality and structural development for these buildings. **ACAFT**

- On a fait des progrès considérables dans l'étude des silos-tranchées à murs élevés. Les résultats de l'expérience correspondent étroitement avec les compressions murales prédites par l'analyse. De nouvelles recommandations relatives à la conception des silos seront formulées après que sera complétée une étude paramétrique des charges de l'équipement de compactage. **UG**

- On a testé un certain nombre de buses à jet-balai de 80° et 110° pour la pression et la hauteur de pulvérisation. Les pressions égales ou inférieures à 100 kPa n'ont pas pu répartir uniformément le jet d'arrosage. **RCAT**

- Des études sur le niveau de poussière dans les porcheries sont en marche. On a constaté que les niveaux de poussière durant l'hiver sont plus élevés que durant l'été, mais ni le taux de ventilation ni celui de la circulation d'air à l'intérieur de la porcherie ne réduit les niveaux de poussière. Lorsqu'il passe au-dessus du matériau isolant, l'air admis par la prise ne contient pas plus de micro-organismes. Ce sont de bonnes nouvelles pour les nombreux producteurs qui tirent l'air de ventilation à partir du grenier. **UG**

- Des directives sur la ventilation naturelle des porcheries seront publiées par le Service canadien des plans. Il s'agit de l'aboutissement de cinq années de recherche sur le contrôle du milieu, la qualité de l'air et le développement structural de tels bâtiments. **ACAFT**

Naturally ventilated swine building using intermittent chimneys, continuous sidewall openings and two summer end wall openings.
Porcherie à ventilation naturelle équipée de cheminées espacées d'ouvertures sur les murs latéraux et de deux ouvertures dans les extrémités pour l'été.

Field Crops

A major component of Ontario agriculture and, consequently, OMAF research is a broad range of crops for both animal and human consumption.

- The program at the University of Guelph has explored the physiological basis for corn hybrid improvement during the past 30 years. The remarkable 2.6% annual rate of improvement in genetic yield potential exceeded the 1.5% annual increase in grain yield improvement of average corn producers during the same period. About 1/3 of the genetic gain can be attributed to increased lodging resistance at higher plant densities. The remainder reflects higher dry matter accumulation, greater stress tolerance and greater photosynthetic rates under stress conditions indicating that modern commercial plant breeding continues to make excellent progress. **UG**

Grandes cultures

La vaste gamme des cultures destinées à la consommation tant animale qu'humaine constitue une composante majeure de l'agriculture ontarienne et, conséquemment, de la recherche du MAAO.

- Le programme de l'université de Guelph a exploré la base physiologique de l'amélioration du maïs hybride au cours des 30 dernières années. Le taux remarquable d'amélioration annuelle de 2,6% dans le potentiel de rendement génétique a dépassé l'augmentation annuelle de 1,5% dans l'amélioration du rendement des céréales des producteurs moyens de maïs au cours de la même période. On peut attribuer le tiers environ du gain génétique à l'augmentation de la résistance des céréales à la verse à des densités de peuplement plus élevées. Le reste reflète des taux plus élevés d'accumulation de matières sèches et de tolérance au stress, amsiqu'une intensification de la photosynthèse sous des conditions de stress indiquant que la sélection végétale commerciale continue de connatre d'excellents progrès. **UG**

- Eight sources of exotic germplasm and an improved corn inbred (CG33) were released in 1989-90 for commercial utilization. Several hybrids were supported for registration and provincial recommendation through the hybrid evaluation program. **UG**

- Maximum economic yield research with corn has been conducted over the past three years. All corn hybrids responded similarly to nitrogen, phosphorus and potassium application. The rates recommended by the Ontario Ministry of Agriculture and Food were more than sufficient to obtain Maximum Economic Yield. **RCAT**

- In 1989-90, support from the Ontario Cereal Crop Committee was received for interim registration of the soft white winter wheat variety OAC 85-7S. This variety represents a breakthrough in OMAF winter wheat breeding. Several additional lines of wheat, barley and oats are progressing through the cooperative registration trials. **UG**

- Progress in developing hybridization systems for alfalfa included several projects to evaluate potential parental populations for hybrids, and to refine somatic embryo desiccation procedures. **UG**

- In 1989, soybean variety OAC Eclipse (2700 units) was released to select seed growers and OAC Frontier (2500 units) was supported for registration and release to seed growers in the summer of 1990. **UG**

- Separate cooperative mechanisms for testing dry edible beans and sweet white lupins have been established. Registrations were granted for three dry edible beans — California Light Red, California Dark Red and California White Kidney beans. **CCAT**

- White bean varieties OAC Sprint, OAC Gryphon and OAC Cygnus were released to seed growers in 1989. In addition two new lines, one upright, were supported for registration. **UG**

- Breeder seed for peanut varieties OAC Ruby and OAC Tango were increased in 1989 for release to seed producers in 1990. **UG**

- Low linolenic acid soybean lines and spring rapeseed lines have been isolated from their respective breeding programs. This characteristic may improve shelf life and reduce hydrogenation costs associated with soybean and canola processing. **UG**

- Early seeded (April 28) barley cultivars in the regional test at New Liskeard averaged 7227 Kg/ha indicating the high potential of this crop in the North. **NLCAT**

- Huit sources de plasma germinatif exotique et de maïs naturel amélioré (CG33) parurent dans le commerce, en 1989-1990. De nombreux hybrides furent appuyés aux fins d'homologation et de recommandation provinciale par le biais du programme d'évaluation des hybrides. **UG**

- La recherche sur le rendement économique maximal du maïs a été poussée au cours des trois dernières années. Tous les hybrides du maïs ont répondu de la même façon à l'application d'azote, de phosphore et de potassium. Les taux recommandés par le ministère de l'Agriculture et de l'Alimentation de l'Ontario étaient plus que suffisants pour obtenir un rendement économique maximum. **RCAT**

- En 1989-1990, on a reçu l'appui du Comité sur les récoltes céréalières de l'Ontario pour l'enregistrement provisoire de la variété OAC 85-7S du blé mou blanc d'hiver. Cette variété représente une percée dans la sélection de blé d'hiver par le MAAO. Plusieurs autres lignées de blé, d'orge et d'avoine progressent par le biais des essais coopératifs d'homologation. **UG**

- Le progrès dans l'élaboration des systèmes d'hybridation de la luzerne comprenait de nombreux projets visant à évaluer les populations parentales possibles d'hybrides et le raffinement des procédures de déssication de l'embryon somatique. **UG**

- En 1989, la variété de fève soya Eclipse (2 700 unités) fut disponible aux producteurs de semences select et l'OAC Frontier (2 500 unités) fut suggérée pour l'homologation et accessible aux producteurs de semences au cours de l'été 1990. **UG**

- On a établi des mécanismes coopératifs distincts pour tester les haricots secs comestibles et les lupins blancs doux. On a accordé l'homologation à trois haricots secs comestibles 8 California Light Red, California Dark Red et California White. **CCAT**

- Les variétés de haricots blancs, OAC Sprint, OAC Gryphon et OAC Cygnus devinrent disponibles aux producteurs de semences, en 1989. De plus, deux nouvelles lignées, dont une à port dressé, furent suggérées pour l'homologation. **UG**

- En 1990, on a augmenté la disponibilité des variétés OAC Ruby et OAC Tango pour la semence des arachides. **UG**

- On a isolé de leurs programmes respectifs de sélection les lignées de fèves soya et de graines de colza du printemps à faible teneur en acide linolénique. Cette caractéristique peut améliorer la durée de conservation et réduire les coûts d'hydrogénation associés avec le traitement des fèves soya et du canola. **UG**

- Les cultivars d'orge semés très tôt (28 avril) dans le test régional de New Liskeard ont atteint une moyenne de 7 227 kg/ha, indiquant le potentiel élevé de cette culture dans le Nord. **NLCAT**

Horticultural Crops

Horticulture research sponsored by OMAF supports a diverse industry covering fruit, vegetable, ornamental and floral crops and turfgrass.

- Two new varieties from the potato breeding program — Eramosa and Saginaw — have recently received full registration. **UG**
- Advanced self-fruitful sweet cherry selections look promising to improve fruit set, thereby increasing returns to growers. **HRIO**
- A system of site suitability ratings for vinifera grapes has been developed based on the revised soil survey and frost probability zones in Niagara. **HRIO**
- Yield of double stemmed seedless greenhouse cucumbers was similar to conventional cropping systems with 60% of normal plant density and cost. **HRIO**
- In asparagus cultivar testing in 1989, two varieties — Jersey Centennial and Jersey Giant — yielded 2551 and 2188 kg/ha marketable yield respectively, a significant improvement over commercial cultivars currently in use. **UG**
- Transgenic potato lines are currently being tested for increased resistance to ozone. **UG**
- Mulching increased the yield and earliness of both pickling and slicing cucumbers at NLCAT. 'Spacemaster', a slicing cucumber, and 'Pioneer', a pickling cucumber, were direct seeded and transplanted on bare ground or a black photodegradable mulch in 1988 and 1989. Mulching increased the marketable yield (#/ha) by 49%, while transplanting increased it by 31%. Mulching significantly increased the number of kilograms harvested in 1989, but not in 1988. **NLCAT**

- Delta Queen and Mirage were identified as two new watermelon cultivars with outstanding yield and quality for local production. **HRIO**
- New 'Little Leaf' cucumber types gave excellent yield in commercial, machine harvested, processing cucumber trials in some cases as high as double conventional types. **HRIO**
- Trials at Simcoe have resulted in additions of Atria, Stonar, Multiton, Strukton and Safekeeper II cabbage cultivars, Baccus and Packman broccoli and White Sails cauliflower to the published list of recommendations in OMAF Pub. 363. **HRIO**

Cultures horticoles

La recherche horticole parrainée par le MAAO appuie une industrie diversifiée couvrant les fruits, les légumes, les cultures ornementales et florales, ainsi que le gazon.

- Deux nouvelles variétés issues du programme de sélection des pommes de terre – l'Eramosa et la Saginaw– ont reçu récemment leur pleine homologation **UG**
- Les sélections améliorées de cerises douces autopollinisées semblent prometteurs pour améliorer la nouaison et par le fait même augmenter les profits aux producteurs. **HRIO**
- On a élaboré un système d'évaluation des régions de culture pour les raisins vinifera en se basant sur l'étude révisée des sols et des zones de probabilité de gelée au Niagara. **HRIO**
- Le rendement des concombres de serre sans pépins et à double tige s'est avéré semblable aux systèmes de culture conventionnelle. Sa densité de peuplement et le coût ne s'élevaient qu'à 60% de la normale. **HRIO**
- En 1989, le test des cultivars d'asperges a révélé deux variétés – Jersey Centennial et Jersey Giant – dont les rendements en produit commercialisable se sont élevés à 2551 et à 2188 kg/ha respectivement, une importante amélioration sur les cultivars commerciaux actuellement en usage. **UG**
- On vérifie actuellement les lignées de pommes de terre transgéniques pour en augmenter la résistance à l'ozone. **UG**
- Le paillage a augmenté le rendement et la précocité des concombres à mariner et à trancher, CTANL. En 1988 et 1989, le "Spacemaster," un concombre à trancher et le "Pioneer," un concombre à mariner, furent tantôt semés directement, tantôt transplantés sur un sol nu ou recouvert d'un film noir photodégradable. Le paillage a augmenté le rendement en fruits commercialisables (#/ha) de 49%, alors que la transplantation l'a haussé de 31%. En 1989, mais non en 1988, le paillage a augmenté de façon appréciable le nombre de kilogrammes récoltés. **NLCAT**

Mulched cucumbers on the left and unmulched cucumbers on the right.
Concombres avec paillage à gauche, sous paillage à droite.

- Le Delta Queen et le Mirage furent identifiés comme deux nouveaux cultivars du melon d'eau avec un rendement et une qualité dominants pour la production locale. **HRIO**
- Les nouveaux types "Little Leaf" ont donné un rendement excellent, parfois le double de celui habituel, dans les essais commerciaux de concombres de transformation, récoltés mécaniquement. **HRIO**
- À la suite des essais effectués à Simcoe, on a ajouté à la liste des recommandations parues dans la publication 363F du MAAO, l'Atria, le Stonar, le Multiton, le Strukton et le Safekeeper II aux cultivars de chou, ainsi que le Baccus et le Packman à ceux de brocoli, et le White Sails à ceux de chou-fleur. **HRIO**

- Identification of improved cultural practices to reduce clove damage prior to planting along with new well-adapted clones has resulted in the effective control of Green Mold disease of garlic that has caused severe crop losses in the past. **HRIO**

- The use of 6-benzyladenine (BA) as a chemical thinner produced 40-50% increase in fruit size in 'Empire' and 'McIntosh' apples with no detrimental effects on post-storage quality. This large increase in size while maintaining quality could increase crop value substantially and improve the competitive position of Ontario apple growers. **HRIO**

- The control of onion smut was significantly improved when a methyl cellulose sticker was applied to the seed immediately prior to the application of carbathiin-thiram fungicide. **HRIO**

- One new strawberry selection, 62E55, has been identified for release as a cultivar. Tissue culture was used to produce virus free plants and runners distributed to a few growers for observation trials. 62E55 outyields the present 'Redcoat' and 'Veestar' standards, has excellent flavour, colour and size and shows resistance to foliar diseases. Another breeding line, 102D24, derived from the wild Fragonia species has upright flower stalks and, as such, has potential for machine harvest. **UG**

- L'identification des pratiques culturales améliorées réduisant les dommages aux clous de girofle avant la plantation ainsi que de nouveaux clônes mieux adaptés a permis d'enrayer efficacement la moisissure verte de l'ail qui a causé des pertes énormes aux cultures dans le passé. **IRHO**

- L'éclaircissage chimique à l'aide du 6-benzyladénine (BA) a augmenté de 40 à 50% le calibre des pommes "Empire" et "McIntosh" sans affecter la qualité après l'entreposage. Cette forte augmentation du calibre et le maintien de la qualité pourraient augmenter la valeur de la récolte de façon substantielle et améliorer la position concurrentielle des producteurs de pommes de l'Ontario. **HRIO**

- On a amélioré sensiblement le contrôle du charbon sur l'oignon en traitant la semence avec un liant de cellulose méthylique inimédiatement avant l'application du fongicide carbathiin-thirame. **HRIO**

- La sélection a donné naissance au nouveau cultivar de fraisier 62E55. Par la culture tissulaire on a produit des plants et des stolons exempts de virus qui ont été distribués à quelques producteurs aux fins d'essais. Le rendement du 62E55 surpasse ceux de "Redcoat" et de "Veestar". Ses fruits ont une saveur, une couleur et une taille excellentes et son plant résiste aux maladies foliaires. Une autre lignée, la 102D24, issue de l'espèce sauvage Fragonia a des pédoncules floraux dressés et comme tels, peut être éventuellement récoltée à la machine. **UG**

Upright flower stalks on breeding line derived from wild Fragaris strawberry species. Potential for machine harvest.
Pédoncules dressés sur une ligne issue d'espèces de fraisiers sauvages. Cette lignée pourrait se récolter mécaniquement.

- Raspberry breeding lines, GU74 and GU75, from Guelph have been selected for entry into the Ontario Plant Propagation Program. It has also been established that 'tipping' and 'promocane suppression' as management techniques should not be used in Ontario plantings. Narrow row widths of 20 cm could gain growers significant benefit with little or no reduction in yield. **UG**

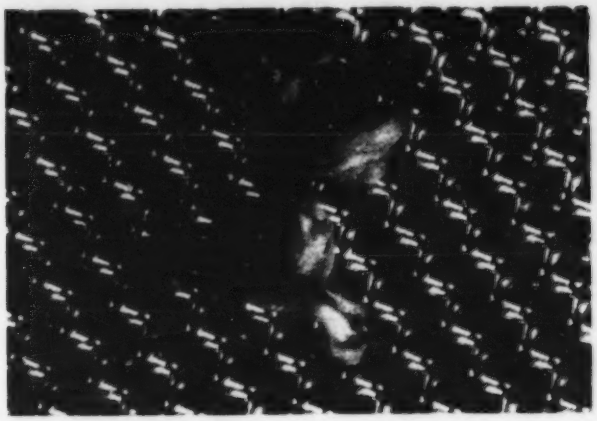
- Recent results indicate that the new growth retardant paclobutrazol (PP333) has strong effects on the growth of apple trees and shows promise for facilitating development of compact, heavily cropping trees. **UG**

- Les lignées de framboises HU74 et GU75, de Guelph, ont été inscrites au Programme de propagation des plantes de l'Ontario. On a également établi qu'il est préférable de ne pas écimer les tiges ni de supprimer les "promocannes" dans les plantations de l'Ontario. Les rangs étroits de 20 cm devraient amener de bons profits sans abaisser le rendement de façon sensible. **UG**

- De récents résultats indiquent que le paclobutrazol (PP333), nouveau ralentisseur de croissance, a des effets bénéfiques sur la croissance des pommiers et s'avère fort prometteur pour faciliter le développement des arbres de taille restreinte portant beaucoup de fruits. **UG**

- Techniques have been developed to obtain somatic embryos from petiole sections of geraniums. These embryos can be dehydrated under controlled conditions, stored and, upon rehydration give rise to geranium plantlets. A patent has been filed for the procedure and the University, in conjunction with OMAF, is pursuing the possibility of marketing this artificial seed technology. **UG**

- On a élaboré des techniques pour obtenir des embryons somatiques à partir des pétioles des géraniums. Ces embryons peuvent être déshydratés sous des conditions contrôlées, conservés, puis, après réhydratation, se développer en plantules de géranium. La technique est en voie d'être brevetée et l'université, de concert avec le MAAO, envisage de commercialiser cette technologie de semence artificielle. **UG**



Dehydrated somatic embryos of zonal geranium on nylon mesh.

Embryons somatiques déshydratés issus de pétioles de géraniums sur une bande de nylon.

- Research indicates that girdling with wire basket transplant containers influences physiological factors, such as size and shape of landscape trees. Municipalities, landscape contractors and nursery growers are anxious to incorporate the results into landscape plantings and practices. **UG**

- Even though nitrogen content is low, urban waste appears to be as effective as other organic fertilizers in turf culture. Potential problems with heavy metals are not unsolvable. **UG**

- Seed of a Ridgetown hot cherry pepper line (78114) was increased in response to a request from a processing company. Four kilograms of seed were sent to the company for large scale field trials during the 1990 season. **RCAT**

- La recherche indique que l'emballage des arbres dans des paniers grillagés pour la transplantation entrave les facteurs physiologiques comme la taille et la forme des arbres paysagers. Les municipalités, les services paysagistes et les pépinières espèrent incorporer les résultats dans les pratiques et l'aménagement paysager. **UG**

- Même si leur teneur en azote est faible, les eaux usées urbaines semblent aussi efficaces que les autres fertilisants organiques dans la culture du gazon. Les problèmes possibles des métaux lourds ne sont pas insolubles. **UG**

- Pour répondre à la demande d'un transformateur, on a augmenté la semence d'une lignée de piments rouges forts (78114) de Ridgetown. Au cours de la saison 1990, quatre kilogrammes de semence furent envoyés à l'entreprise pour des essais sur place à grande échelle. **RCAT**

Pest Management

The focus of the pest management research is on the reduction of synthetic chemical pesticides in the environment through the development of integrated pest management programs that combine reduced pesticide application with genetic resistance, biological controls, cultural practices, problem specific pesticides etc.

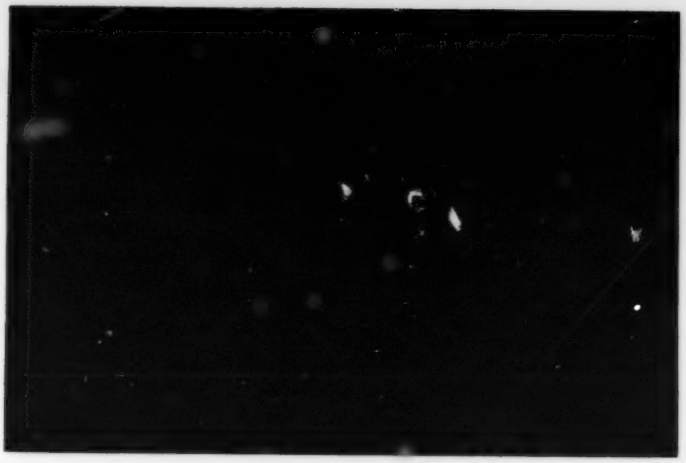
Lutte contre les ennemis des cultures

La recherche sur la lutte contre les ennemis des cultures met l'accent sur la réduction des pesticides chimiques synthétiques dans l'environnement. Elle repose sur l'élaboration de programmes de lutte intégrée contre les ennemis des cultures alliant l'application réduite de pesticides à la résistance génétique, aux contrôles biologiques, aux pratiques culturales, et aux problèmes spécifiques soulevés par les pesticides, etc.

- The use of the bacterium Bacillus thuringiensis, decreases the need for chemical insecticides by 40 per cent. The bacteria have worked well on the Colorado potato beetle and European corn borer. Once the bacteria are ingested, they produce toxin that kills the insect. The project is aimed at eliminating the possibility of chemical residues in corn and potatoes. **KCAT**

- L'usage de la bactérie (bacillus thuringiensis) diminue de 40% la nécessité d'utiliser des insecticides chimiques. Nouvelle à l'Est de l'Ontario, la bactérie a connu du succès contre le doryphore de la pomme de terre et la pyrale du maïs, insectes qui n'y sont pas encore résistants. Une fois les bactéries ingérées, elles produisent des toxines qui tuent l'insecte. Le projet vise à éliminer la possibilité de résidus chimiques dans le maïs et les pommes de terre. **KCAT**

The Colorado potato beetle.



Le doryphore de la pomme de terre.

- Greater than 90% control of mushroom gnats has been achieved by Bacillus thuringensis and 80% by entomopathogenic nematodes. **HRIO**
- A new herbicide, DPX 79406, shows effective post emergent control of annual grasses in corn at a rate of about 15 grams per hectare — much less chemical than is required with currently registered soil applied herbicides. **UG**
- Biological control of flies in dairy barns has been developed using Muscovy ducks. These ducks remove houseflies from the barns at 30 times the rate of four commercially available fly control devices. Reduction in fly density ranges from 97 to 99 percent. **UG**
- Studies on IPM scouts indicated that during their normal field activities, they were exposed to low concentrations of pesticide residues. The use of protective clothing and its decontamination are being investigated. Most residues were removed from work clothes through laundering procedures and depended on the number of washings and water solubility of the pesticides. **ALS**
- New application technology is being evaluated and developed at the RCAT to control corn rootworms. Presently insecticides are applied at planting. The new method injects liquid insecticides under pressure 6 to 8 weeks after planting when the larvae are active. With the success of the new technology, there is an opportunity to treat fewer fields with less insecticide. **RCAT**
- A decision threshold has been developed at the RCAT for the control of the potato leafhopper in dry edible beans. With optimum timing, insecticides may be banded rather than broadcast, thus reducing the amount of insecticide required for leafhopper control in dry edible beans. **RCAT**
- A number of naturally occurring mycelial fungi, yeasts and bacteria show potential as biocontrol agents to suppress grey mold fruit rot. **UG**
- Trimming crops in the field and culinary practices in the home such as washing, peeling and cooking reduce pesticide residues on most raw fruit and vegetables. **ALS**

- On en est arrivé à réprimer plus de 90% des moucherons sur les champignons avec bacillus thuringiensis et 80% avec des nématodes entomopathogéniques. **HRIO**
- Un nouvel herbicide, le DPX 79406, offre un contrôle efficace des mauvaises herbes annuelles en post-émergence dans le maïs lorsqu'il est épandu au taux d'environ 15 grammes par hectare – dose beaucoup plus faible que celle recommandée pour les herbicides habituels. **UG**
- On a mis en valeur le contrôle biologique des mouches dans les étables en utilisant les canards Muscovy. Ces canards éliminent les mouches domestiques des étables 30 fois plus rapidement que quatre appareils commerciaux de répression des moustiques. On a ainsi réduit les populations de mouches de 97 à 99%. **UG**
- Les études effectuées sur les dépisteurs en lutte intégrée contre les ennemis des cultures indiquent qu'au cours de leurs activités normales dans les champs, ils étaient exposés à de faibles concentrations de résidus pesticides. On étudie présentement le type de vêtements de protection et leur décontamination. La plupart des résidus sont enlevés des habits de travail à l'aide de détersifs. Le nombre de lavages requis est fonction de la solubilité des pesticides dans l'eau. **ALS**
- Au RCAT, on est en voie de créer et d'évaluer une nouvelle technologie pour réprimer les vers des racines du maïs. À l'heure actuelle, on épand les insecticides au semis. Selon la nouvelle méthode, les insecticides liquides sont injectés sous pression 6 à 8 semaines après la plantation, au moment où les larves sont actives. Compte tenu du succès de la nouvelle technologie, il est possible qu'on puisse réduire et le nombre et la dose des traitements. **RCAT**
- Au RCAT, on est sur le point de prendre une décision critique concernant la lutte contre la cicadelle de la pomme de terre dans les haricots secs comestibles. Si le moment est propice, les insecticides peuvent être épandus en bandes plutôt qu'à la volée; on réduit ainsi la dose requise pour la répression de la cicadelle dans les haricots secs comestibles. **RCAT**

- Guidelines for predicting white mold in white beans have been developed incorporating information on availability of inoculum and susceptible tissue and environments conducive to disease development. This information will assist growers in assessing both the need for and timing of spray applications. **UG**

Bees and Pollination

The advance of the tracheal mite across the border into Ontario is an area of great concern to the industry at this moment.

- Miticides, effective in controlling tracheal mites in honey bees in warmer climates, do not provide sufficient control under Ontario conditions to be of benefit in colony management. Other studies continue to explore possible solutions to this problem. **UG**

Food Processing

Significant research funding flows from OMAF into the preservation of locally grown food products in order to help increase efficiency, self sufficiency and to help our industry compete with imported products.

- Results of work on chipping quality of potato cultivars have shown that it is possible to produce genotypes with low contents of reducing sugars by crossing either a storage chipping cultivar or a non-chipping variety and a cold temperature processing cultivar. Low reducing sugar content is key to acceptable chipping colour. **UG**

Potato chips made from Saginaw Gold potatoes.
Croustilles de pommes de terre Saginaw Gold.

- Initial work into egg yolk protein has shown that the chicken is less efficient than the quail in producing yolk proteins. Future studies will focus on biotechnological means to control yolk protein to improve egg quality and composition. **UG**
- Studies of the action of salt in processing meat have determined that it is the chloride anion that has the most profound effect rather than the sodium cation. In order to address consumer concerns about sodium in the diet, it may be possible to substitute other chloride salts for NaCl and retain the desired processed meat characteristics. **UG**

- À l'état naturel, un certain nombre de mycéliums, de levures et de bactéries, démontrent un potentiel comme agents de lutte biologique contre la moisissure grise des fruits. **UG**
- L'habillage des cultures dans le champ et la préparation domestique des aliments, comme le lavage, l'épeluchage et la cuisson réduisent les résidus pesticides sur la plupart des fruits et des légumes crus. **ALS**
- On a élaboré des directives permettant de prévoir l'existence de la moisissure blanche dans les haricots blancs à partir des renseignements sur la disponibilité de l'inoculum, du tissu prédisposé et des milieux favorables au développement de la maladie. Ces renseignements permettront aux producteurs d'évaluer le besoin et le moment propice des pulvérisations. **UG**

Les abeilles et la pollinisation

L'arrivée de l'acarien trachéal en Ontario préoccupe beaucoup l'industrie apicole.

- Les acaricides efficaces dans le contrôle des acariens trachéaux chez les abeilles domestiques des climats plus chauds n'assurent pas un contrôle suffisant sous les conditions ontariennes, pour que la régie de la colonie en tire profit. D'autres études continuent d'explorer les solutions possibles à ce problèmes. **UG**

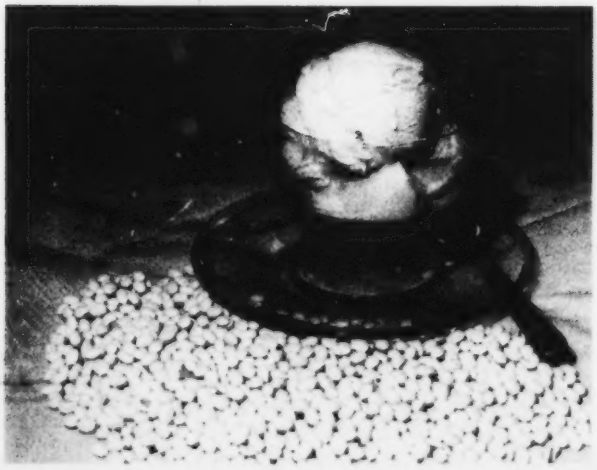
Transformation des aliments

Le MAAO a alloué des fonds de recherche importants à l'industrie de la conserverie des produits alimentaires locaux afin qu'elle devienne plus efficiente et auto-suffisante et pour l'aider à concurrencer les produits importés.

- Les résultats des travaux de recherche sur la "qualité à croustilles" des cultivars de pommes de terre indiquent qu'il est possible de produire des génotypes à faible teneur en sucres réducteurs en croisant un cultivar à croustilles pour entreposer ou un cultivar non convenable pour les croustilles avec un cultivar de type à congeler pour la transformation. Il est nécessaire d'utiliser des pommes de terre à faible teneur en sucres réducteurs pour obtenir des croustilles de couleur acceptable. **UG**

- Les travaux préliminaires sur la protéine du jaune d'oeuf indiquent que la poule pondeuse est moins efficace que la caille dans la production des protéines du jaune d'oeuf. Les études ultérieures s'attarderont sur les moyens biotechnologiques susceptibles de contrôler la production de protéines des jaunes d'oeufs en vue d'améliorer la qualité et la composition de l'oeuf. **UG**
- Les études sur l'action du sel dans le traitement de la viande ont établi que c'est l'anion chlorure plutôt que le cation sodium qui a le plus d'effet. Pour répondre aux préoccupations des consommateurs concernant le sodium en alimentation, il serait peut-être possible de remplacer le NaCl par d'autres sels chlorés, tout en conservant les caractéristiques souhaitées de la viande traitée. **UG**

- In the measurement of meat quality, considerable progress has been made with optical methods for the measurement of connective tissue content and fat as well as measurement of meat colour. Research in these areas has reached the point where commercial development is possible. **UG**
- Research on restructuring of beef has focused on the effect of binding agents and processing conditions on texture. Initial investigations in model gel systems indicated that gelatin had superior binding properties over the other protein and plant hydrocolloid binders studied. This finding has been verified in restructured steaks. Work now centres on texturization of products through extrusion technology. **KCAT**
- The effect of casein on the thermal precipitation of whey proteins is being investigated by heating blends of casein micelles with whey at various pH levels. Results of this research may allow the co-precipitation of whey proteins with casein, resulting in increased protein in cheese products, and removal of the protein from whey. **KCAT**
- Because of the versatility of the white pea bean, a number of dishes have been successfully produced including appetizers through to dessert items. One of the products that has attracted considerable attention is a bean ice cream. It is presently undergoing further refinement for possible commercial processing. **CCAT**



White bean ice-cream.
Crème glacée à base de haricots blancs.

- New storage technologies involving low oxygen atmospheres are being evaluated for reduction of insect storage disorders of apples to help the industry maintain a competitive edge in export markets which demand disease and pest free produce. **HRIO**
- Storage of Spanish onions for up to six months looks promising to facilitate the supply of high quality processed onion rings to the domestic and export markets. **HRIO**
- Several grape cultivars with exceptionally high red pigment content have been identified as candidates for production of highly pigmented juices as natural colourants in the food and beverage industry. **HRIO**

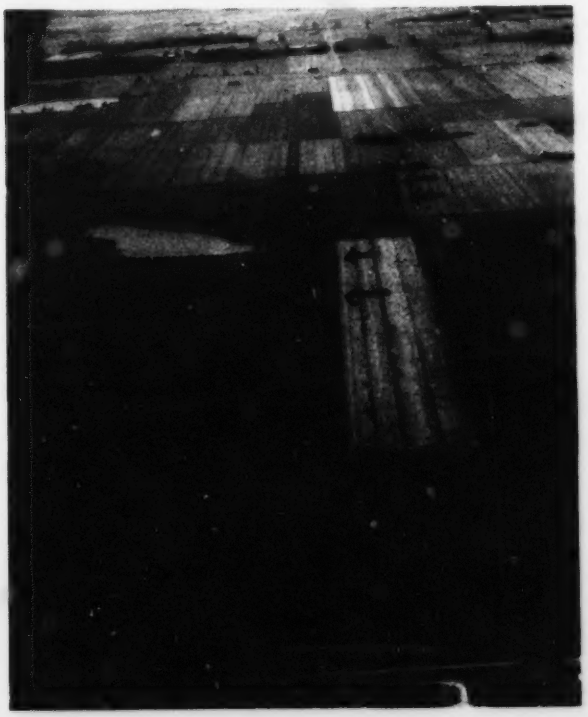
- Dans l'évaluation de la qualité de la viande, on a réalisé des progrès considérables avec des méthodes optiques, pour mesurer la teneur en tissu conjonctif et en gras ainsi que la couleur de la viande. La recherche dans ce domaine en est au point où le développement commercial est possible. **UG**
- La recherche sur la restructuration du boeuf s'est attardée sur l'effet des agents liants et des conditions de transformation sur la texture. Les premières études sur les modèles de systèmes gélifiants indiquent que la gélatine aurait des propriétés liantes supérieures aux autres protéines et liants hydrocolloïdaux d'origine végétale étudiés. Cette découverte a été vérifiéee dans l'élaboration de biftecks restructurés. Le travail se concentre maintenant sur la texturisation des produits par extrusion. **KCAT**
- On étudie présentement l'effet de la caséine sur la précipitation thermique des protéines du petit-lait en chauffant des mélanges de micelles de caséine avec du petit-lait à différents niveaux de pH. Les résultats de cette recherche peuvent permettre la co-précipitation des protéines du petit-lait avec la caséine, se traduisant par une augmentation de protéines dans les produits fromagers et la récupération de la protéine du petit-lait. **KCAT**
- Le haricot blanc est d'utilisation tellement polyvalent qu'on a pu l'utiliser avec succès dans la préparation d'un certain nombre de plats allant des amuse-gueules aux desserts. Un des produits qui a attiré beaucoup d'attention est une crème glacée à base de haricots blancs. On est présentement à améliorer le procédé pour son utilisation commerciale éventuelle. **CCAT**

- On évalue présentement de nouvelles technologies d'entreposage à faible teneur en oxygène pour réduire les problèmes causés par les insectes aux pommes entreposées et ainsi permettre à l'industrie de se maintenir à un niveau concurrentiel sur les marchés d'exportation qui exigent des produits exempts de maladies et d'insectes. **HRIO**
- Il semble que l'on pourra bientôt entreposer l'oignon d'Espagne pour une période allant jusqu'à 6 mois. Cela devrait faciliter l'approvisionnement des marchés locaux et d'exportation en rondelles d'oignon de qualité supérieure.
- On a identifié plusieurs cultivars de raisins ayant un niveau de pigmentation rouge exceptionnel qui pourraient servir à l'extraction de jus fortement pigmentés destinés à devenir des colorants naturels pour l'industrie des aliments et des breuvages. **HRIO**

Soil, Water and Air

The emphasis of OMAF's soil and water research efforts is on the prevention and mitigation of deterioration of these precious resources while maintaining productivity.

- Spray application scheduling for tomatoes relies on temperature and leaf wetness duration data gathered in the crop field with specialised sensors. Recent agroclimatology work has determined that leaf wetness data can be replaced with estimates calculated from temperatures taken near, but outside, the tomato field along with dew point data from local weather stations. **UG**
- A computer model (Guelph Rainfall Simulator II) is now fully calibrated and functional to assist in the understanding of erosion processes from shallow overland flow of water. **UG**
- Early results indicate that riparian forest plantations can be used to reduce stream flow rates and thus soil erosion. **UG**
- Conservation tillage systems have been shown to consistently reduce the extent of erosion. The final maximum economic yields were not significantly different between tillage systems for no till corn versus conventional tillage. **UG**
- Compaction through poor field management practices was duplicated successfully using a liquid manure tanker. Measured yields of alfalfa from compacted plots were less than 50% of yields taken from non compacted plots. Subsoiling to break compacted layers in combination with alfalfa and minimum tillage is now being investigated. **ACAFT**
- Alfalfa yields were measured on a site where three drainage treatments are being tested. Results show that land crowning without tile drainage gives as equally good results on fine textured soils as land crowning with tile drainage and at a substantially lower cost. **ACAFT**



Le sol, l'air et l'eau

Dans ses projets de recherche sur le sol et l'eau, le MAAO a mis l'accent sur la prévention et la réduction de la détérioration de ces précieuses ressources tout en maintenant la productivité.

- Les cédules de pulvérisations des champs de tomates sont basées sur les données de température et de la persistance d'humidité des feuilles, lesquelles sont fournies par des senseurs spéciaux installés au champ. De récents travaux en agroclimatologie ont établi que les données sur l'humidité des feuilles peuvent être remplacées par des valeurs estimées à partir des températures prises à proximité du champ de tomates et combinées avec les données du point de condensation obtenues des stations météorologiques locales. **UG**
- Un modèle d'ordinateur (Guelph Rainfall Simulator II) est maintenant entièrement calibré et fonctionnel pour aider à la compréhension des procédés d'érosion causée par des écoulements d'eau en couche mince en surface du sol. **UG**
- Les résultats préliminaires indiquent que l'on peut avoir recours à des plantations forestières riveraines pour réduire le débit des cours d'eau et par conséquent l'érosion du sol. **UG**
- Les pratiques culturales de conservation ont constamment réduit les dommages causés par l'érosion. Dans le cas du maïs, on n'a pas trouvé de différence significative au niveau du rendement économique maximum final entre le système conventionnel de travail du sol et le semis direct. **UG**
- À l'aide d'un épandeur à fumier liquide on a reproduit avec succès la compaction du sol occasionnée par de mauvaises pratiques culturales. Les rendements en luzerne mesurés sur les parcelles compactées étaient moins de 50% des rendements des parcelles non compactées. On étudie présentement l'effet du sous-solage, de la culture de la luzerne et du travail minimum du sol sur la compaction du sol. **ACAFT**
- On a mesuré les rendements de la luzerne sur un site où l'on évalue trois systèmes différents de drainage. Les résultats indiquent que, sur les sols à texture fine, les planches en faîte non drainées souterrainement donnent d'aussi bons résultats que les planches en fate avec drainage souterrain et à un coût de beaucoup inférieur. **ACAFT**

An aerial photo of the crowning project. The crowned plots (marked with arrows) have a higher percentage of alfalfa as compared to flat tile drained plots.
Photo aérienne du projet de planches en faîte. Les parcelles en faîte (marquées d'une flèche) montrent un plus fort pourcentage de luzerne que les parcelles planes drainées souterrainement.

Economics

The OMAF research program in economics is concerned with the international picture as well as with individual farm management and financial practices.

- The calculation of rates of return to agricultural research in Canada continues to show high rates for all major livestock enterprises. For beef, swine and sheep research, the net positive benefits accrue mainly to the producer and net benefits from research in the supply managed commodities accrue mainly to the consumer. **UG**

- A human resources management study on Ontario hog farms indicates that these farmers were successful in motivating their workers but the wages, hours of work and benefits may have to be improved to continue to attract good workers. **UG**

- Using a ten-year timeframe (1980 to 1988), it was concluded that on average an extra $73 to $81 per cow per annum could be earned if the cow-calf operators fed their calves to a short-keep weight as opposed to selling at a weaned weight. Findings suggest that while price risk is large, year to year variation was larger for calves weighing 400 to 500 lbs. than for those weighing over 800 lbs. **RCAT**

- Findings of resent research indicate that Ontario farmers' gross incomes are likely to be higher in 1990 and that the provincial totals will be higher in Ontario than in other Canadian provinces. Farm land and building values gained in 1989 for the second year in a row after seven years of decline. Future income conditions and structural adjustments will depend, in part, on the impact of GATT and CUSTA negotiations. The GST will likely have little impact on the farm sector. **UG**

- A study of farmer bargaining activity when purchasing machinery and fertilizer indicated most (82%) bargained when buying machinery and saved an average of 10% of the cost. The time taken in bargaining returned $450 per hour. Thirty four percent bargained when purchasing fertilizer reducing the cost by an average of 5% and earned $40 per hour. Farmers can influence input costs by bargaining and should develop suitable bargaining strategies. **UG**

Economie

Le programme de recherche du MAAO en économie rurale s'intéresse à l'aspect international aussi bien qu'à la gestion des entreprises agricoles individuelles et à leurs pratiques financières.

- Le calcul du rendement de la recherche agricole au Canada continue de montrer des taux élevés pour toutes les entreprises majeures dans l'élevage du bétail. Pour ce qui est du boeuf, du porc et du mouton, les revenus nets de la recherche avantagent le producteur alors que dans le cas des productions régies par des offices de mise en marché c'est le consommateur qui est avantagé. **UG**

- Une étude de gestion des ressources humaines sur les entreprises porcines de l'Ontario a révélé que ces agriculteurs ont su motiver leurs employés mais qu'il y aurait peut-être lieu d'améliorer les salaires, le nombre d'heures de travail et les avantages sociaux pour continuer à attirer les bons travailleurs. **UG**

- En se basant sur une période d'environ 10 ans (1980 à 1988), on est arrivé à la conclusion qu'en moyenne les éleveurs de veau pourraient gagner un montant additionnel de 73 à 81 $ par vache par année s'ils gardaient leurs animaux jusqu'à la pré-finition plutôt que de les vendre au sevrage. Les résultats suggèrent que si les risques monétaires sont élevés, par contre, le prix des veaux de 180 à 225 kg a varié plus d'une année à l'autre que celui des sujets pesant plus de 360 kg. **RCAT**

- Des résultats de recherche récents indiquent que les revenus bruts des agriculteurs de l'Ontario seront probablement plus élevés en 1990 et que la production agricole totale de la province sera plus élevée en Ontario que dans les autres provinces canadiennes. Lea valeur des terres et des bâtiments agricoles a connu une hausse en 1989, pour la seconde année consécutive après avoir été à la baisse durant sept ans. Les prochaines conditions affectant le revenu et les ajustements structuraux en agriculture dépendront en partie de l'impact des négociations du GATT et du CUSTA. La TPS aura probablement peu d'impact sur le secteur agricole. **UG**

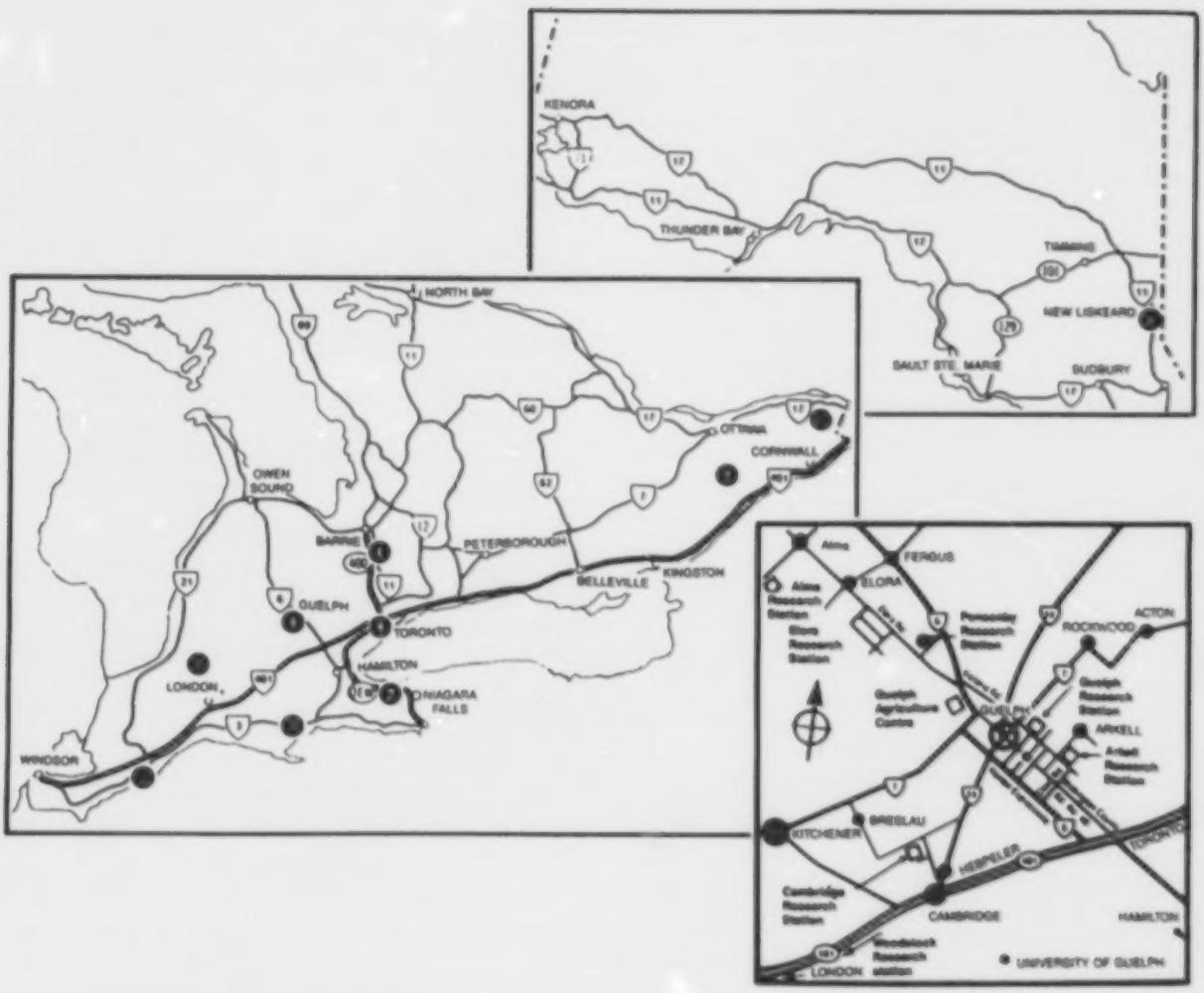
- Une étude sur le marchandage des agriculteurs au moment d'acheter de la machinerie et des fertilisants a rapporté que la plupart (82%) négociaient au moment d'acheter de la machinerie et épargnaient en moyenne 10% du prix. Le temps pris à négocier représentait un rendement de 450 $ par heure. Trente-quatre pour cent des agriculteurs négociaient au moment d'acheter des fertilisants, en réduisant ainsi le coût de 5% en moyenne et réalisant un bénéfice de 40 $ par heure. Les agriculteurs peuvent influencer le coût des intrants en négociant et devraient développer des stratégies de négociation valables. **UG**

J. C. Rennie
Director of Research
ARIO

Inventory of Agricultural Research Projects

The inventory of agricultural research projects contains all projects that were active during the fiscal year 1989-90. All those listed were funded completely or in part by the Ontario Ministry of Agriculture and Food. Those at the University of Guelph are carried out under an agreement with the Ministry.

INVENTORY OF AGRICULTURAL RESEARCH PROJECTS



1. Centralia College of Agricultural Technology
2. Horticultural Research Institute of Ontario, Vineland Station
3. Horticultural Experiment Station, Simcoe
4. Muck Research Station, Bradford
5. Kemptville College of Agricultural Technology
6. New Liskeard College of Agricultural Technology
7. Ridgetown College of Agricultural Technology
8. University of Guelph, and Agricultural Laboratory Services (OMAF)
9. Economics and Policy Coordination Branch (OMAF, Toronto)
10. Alfred College of Agriculture and Food Technology

AGRICULTURAL ENGINEERING SERVICES

Located in twelve offices across the Province, staff of the Agricultural Engineering Services are involved in a variety of on farm projects to evaluate and demonstrate new technology. Research results often require refinement and adaptation to fit existing systems before the technologies can be utilized on the farm. By monitoring and interpreting these projects, engineers are able to implement new information more rapidly into agricultural operations.

PROJECT TITLE	RESEARCHER
Ambient air drying of large round bales	Plue
Assessment of coatings for tower silos	Bellman, Plue
Comparative study of energy consumption in weaner hotrooms	Gibb, Sojak
Comparison of fresh air inlets in small livestock rooms	Turnbull, Kains
Demonstration forced air cooling of tender fruits	Fraser
Determination of the effect of different ventilation rates, recirculation systems and management parameters on dust and gas levels in swine buildings	Morrison, Ogilvie
Development of concrete pesticide storages	Hilborn
Development of a heavy trash manure injection system	Hilborn
Development of an irrigation scheduling method for the potato crop in Ontario	Brown, Dixon, Jung
Development of small diameter tile systems	Hilborn
Effect of irrigation on hay yield in Eastern Ontario	Cuthbertson
Evaluation of effect of farmstead water changes	Hilborn
Evaluation of electronic controller for heaters in livestock barns	Huffman
Evaluation of soil erosion control structures	Stone
Flow measurements in small watersheds	Johnson, Stone
Ground frost study	Kirik
Guidelines for natural ventilation of swine buildings	Choinière
Investigation of installation cost and durability of four manger surfaces in a tie stall dairy	Clarke, Wheeler
Mole drainage project	Cuthbertson
Natural air grain drying pilot project	Hawkins, Kirik
Northern Ontario open ridge	Kirik
Nutrient value of run-off storages	Clarke
Porous ceiling ventilation	Kirik
Potential energy savings with natural versus mechanical ventilation in Ontario	Choinière
Thermal behaviour of sprayed-on polyurethane foam in high humidity	House
Transient nature of hazardous conditions in swine barns due to manure gases released during slurry mixing	Clarke, Patni
Silo selection expert system	Toombs

AGRICULTURAL LABORATORY SERVICES

The Provincial Pesticide Residue Testing Laboratory is one of three sections of Agricultural Laboratory Services. The research objectives are to improve and amend pesticide registrations and recommendations in order to reduce residues below the negligible level of 0.1 mg/kg wherever possible. The physical dispersal, chemical breakdown, and microbiological degradation of pesticides and toxic metabolites are monitored to set pre-harvest intervals for application of the chemicals. This research adds to our general understanding of the fate of pesticides in the environment and food.

Studies on the hazards of re-entry into treated areas help minimize the risks in using pesticides. This research includes monitoring the exposure, absorption, and excretion of pesticides of those who use them and studying the effect of laundering clothing to help minimize the risk of applying these chemicals. Studies on culinary practices and cooking are being conducted to determine what residues can be removed or reduced by these means.

PROJECT TITLE	RESEARCHER
LIVESTOCK	
Translocation of topically applied synthetic pyrethroid insecticide on bovine	Surgeoner, Ripley
ENGINEERING	
Analytical method and development for new fungicides and herbicides	Ripley, Clegg
Congener specific PCB analysis	Rasper, Ripley
Immunoassay evaluation	Clegg, Hall, Burchat
Modelling pesticide dissipation	Ripley, Clegg, Ritcey, Frank
Rinsing of sprayers	Ripley, Clegg
FIELD CROPS	
Integrated weed management in white beans	Swanton, Clegg
Monitoring flue-cured tobacco and soils on 34 farms for pesticide residues and metal contents	Frank, Burchat, Ripley, Clegg, Suda, Zilkey
FOOD AND FOOD QUALITY	
Disappearance of pesticides from grapes made into wine	Clegg, Ripley, Frank
Iodine levels in milk	Ripley, Chapman
Method development for drugs including sulfathiazole and other drugs	Chapman, Burchat, Ripley, Clegg
Monitoring animal tissues for pesticide residues and metals	Frank, Ripley, Luyken
Monitoring Ontario-grown fruit and vegetables for pesticide residues	Frank, Clegg, Ripley, Wheeler
Researching residue behaviour in raw and processed fruit and vegetables	Frank, Ripley, Burchat
Sources of PCP in animal tissues	Frank, Clegg, Butler

PROJECT TITLE	RESEARCHER
HORTICULTURAL CROPS	
Dissipation of fungicide residues from minor crops	Ripley, Ritcey
Dissipation of herbicide residues from onions and organic soils	Clegg, Frank
Dissipation of insecticide residues from minor crops	Frank, Ripley, McEwen
Dissipation of pyrethroids from muck crops	Ripley, McEwen, Frank
Fungicides for protection of carrots against storage rots	Ripley, MacDonald
Studies on pesticides for minor crop registration	Frank, Ripley, Clegg
HUMAN EXPOSURE	
Following the changes in organochlorine residues in Ontario residents	Ripley, Rasper
Monitoring and reducing IPM scout exposure	Ripley, Burchat
Reducing applicator exposure to herbicides	Clegg, Frank, Ciba Geigy
Reducing residues through culinary practices	Frank, Ritcey, Ripley, Burchat
Re-entry into treated crops	Ripley, Ritcey, Frank, Clegg
SOIL, WATER, AND WASTE MANAGEMENT	
Metolachlor dissipation in the field	Clegg, Frank, Patni
Monitoring shallow and deep wells for pesticides and anions	Frank, Chapman, Ripley, Clegg
Monitoring surface water for pesticides and anions	Frank, Chapman, Clegg, Ripley
Stability of pesticides in water	Clegg, Ripley, Frank, Chapman

ALFRED COLLEGE OF AGRICULTURE AND FOOD TECHNOLOGY/ COLLEGE DE TECHNOLOGIE AGRICOLE ET ALIMENTAIRE D'ALFRED

Alfred College is located 65 km east of Ottawa on the Trans-Canada Highway, #17. It is in the heart of the highest concentration of francophones in the Province and French is the language of administration and teaching at the College. It is also in one of the main milk-producing regions of Ontario where soils for the most part are of very productive clays; by their very nature, however, they are poorly drained.

Research began at the ACAFT in 1983 with a project to resolve drainage problems in this clay soil. In the fall of 1985, another was begun to evaluate the use of mole drains in combination with 'French' drains. This research has been quite successful and further work is underway.

Another project involves the improvement of designs for natural ventilation systems and to compare natural and mechanical ventilation of swine barns. In livestock feeds, interesting work has been undertaken to evaluate the use of near infrared equipment for analysing nutrients.

The College has crop demonstration plots, begun in 1984, and a maple bush in which demonstrations are given. The land base is 150 hectares.

PROJECT TITLE	RESEARCHER
Alfalfa yield performance with improving Surface and subsurface drainage of fine textured soils	Natho-Jina, Weil, Chambers
Guidelines for natural ventilation of swine buildings	Choinière, Tremblay, Munroe
Improving the degraded structure of fine textured soils with deep tillage and legume crops — Project # 6162	Chambers, Natho-Jina, Weil, Culley, McKyes
Mole drainage of flat lands	Natho-Jina, Weil, Chambers, Wires
Potential energy savings with natural versus mechanical ventilation in Ontario	Choinière, Tremblay, Munroe
Wind tunnel studies of naturally ventilated farm buildings	Choinière, Tanaka, Munroe

CENTRALIA COLLEGE OF AGRICULTURAL TECHNOLOGY

Centralia College is in the heart of Western Ontario's diverse agricultural region. In agronomy, researchers test new practices in production, such as different row widths and planting dates and the use of crop rotations and plowdown legumes, for white and coloured beans, soybeans for human and animal consumption, canola, and rutabagas. New varieties are tested for traits such as their yield potential, and pesticide screening trials are held. These data are used in selecting varieties and pesticides for registration and are the basis for Ministry production recommendations. Development continues at the new Agronomy Research Farm and the Agronomy laboratory has recently been completed.

PROJECT TITLE	RESEARCHER
FOOD SERVICE	
Utilization of white pea bean	Currie
AGRONOMY	
Corn variety trials	O'Toole
Disease control in field beans	Forrest
Evaluation of plowdown species in spring grain and corn	Forrest
Insect control in white beans	O'Toole
Lupin fertility trials	Forrest
Lupin variety testing and management	Forrest
Oil and protein crop variety and management trials	Forrest
Pest control in rutabagas	Brolley
Rutabaga production and management	Brolley
Soybeans	Forrest
Sweet corn production and management	Brolley
Weed control in canola	O'Toole
Weed control in corn	O'Toole
Weed control in field beans	O'Toole
White and coloured bean management	Forrest
ENGINEERING	
Extent and causes of water quality problems in the subsurface drainage in the Parkhill Creek Watershed	Fleming

ECONOMICS AND POLICY COORDINATION BRANCH

The Branch is divided into three units, Policy Development, Policy Coordination, and Economic Information, and plays a central role in the overall functioning of the Ministry. Its main responsibilities lie in the development, coordination, and analysis of policy initiatives that affect the agriculture and food industry.

At the request of the Minister and senior Ministry officials, advisors and researchers in the Branch assess the economic implications of different policy choices. A number of projects are continuous including monthly newsletters on the latest data and developments in agricultural trade, in processing, distributing, and retailing (PDR), and in the farm supply business.

Economists in the Branch monitor foreign agricultural policies and developments in Ontario, other parts of Canada, and around the world and analyze them for their effects on the provincial industry. Analyses have also been carried out on matters such as the development of food quality and safety standards, various GATT Panel rulings, the beef industry task force, income stabilization, and the grape and wine industry.

The Policy Coordination unit guides the flow of legislation, regulations, and orders-in-council between the Ministry and central agencies with which the Ministry is in constant contact. It also schedules meetings and conferences for senior officials.

The Economic Information Services unit monitors the efficiency of agricultural production through a number of avenues: surveys of farms and farm supply companies, computer models on costs of production, and collation of local with international data to yield commodity price and profitability forecasts for major commodities. The unit pub-

lishes Provincial agricultural statistics each year, and makes current domestic and international prices and commodity analysis for the main products available through the Farm Market News Service. This Service telephones information into radio stations for broadcasting and directly to anyone who wishes it.

PROJECT TITLE	RESEARCHER
Agricultural Statistics for Ontario	Statistical Services Unit
Apple, peach and grape, estimated establishment costs	McKibbon
Consumer attitudes concerning direct farm sales outlets	Tmej
Economics of beef feedlot production	Fisher
Economics of cow-calf production	Fisher
Economics of sheep production	Fisher
Economics of swine production	Fisher
Fruit crops, estimated production costs	McKibbon
Grain and forage crops, estimated production costs	Campbell, Hope, Burgess
Survey of custom farmwork rates	Burgess
Survey of pesticide use in Ontario	Moxley
The proposed federal goods and services tax and the agrifood sector	Thompson
Vegetable crops, estimated production costs	Hope, Campbell, McKibbon, Burgess

HORTICULTURAL RESEARCH INSTITUTE OF ONTARIO

HRIO is situated in the midst of Ontario's, and indeed Canada's prime horticultural region. It is made up of four units: the Horticultural Experiment Station and Horticultural Products Laboratory at headquarters in Vineland station, the Horticultural Experiment Station at Simcoe close to Lake Erie, and the Muck Research Station at Bradford in the Holland Marsh north of Toronto. Each unit has a specialized function, but the overall objective of the programs is to develop crops and varieties which will help make Ontario more self-sufficient in these types of food, storage and processing technologies which will extend the market life of domestically grown produce, and mechanized crop management and energy conservation for efficient production.

AT HES, Vineland, attention is focused on protected food crops, tender and small fruits, tree fruits, edible fungi, ornamentals and cut flowers, and plant nutrition for a variety of species. Including a grape sub-station, the land base is 90 hectares.

Researchers at the HPL, Vineland, investigate storage, handling, processing, and quality of harvested fruits and vegetables. The evaluation of cultivars from HRIO's breeding program and of those from other regions is a very important part of their work. The Laboratory is increasingly concerned as well with the development of further-processed, added-value products.

The grape and wine programme at HPL is a long-standing one which includes specialists in bio-chemistry, engineering, food science, oenology, post-harvest physiology, sensory science, and microbiology. The recent development of sparkling and still grape juice products is helping make use of grapes of cultivars no longer used in winemaking.

HES, Simcoe, concentrates its efforts one-third on fruit and two-thirds on vegetables, a reflection of the commercial production in that area. Fruit research includes extensive work on apples as well as on small fruits such as strawberries, highbush blueberries, raspberries, currants, and the recently introduced tayberry from Scotland. Vegetable research emphasizes the mechanical harvesting of processing crops, particularly tomatoes and cucumbers, field tomato breeding, and the epidemiology and control of diseases.

In the past few years as well, an extensive program to develop horticultural crops as alternatives to tobacco has been set up at Simcoe under the name of The Transition Crop Team.

At the three-hectare Muck Research Station, research is focused on crops grown in the organic soils of the ancient lake bottom: chiefly onions, carrots, lettuce, and celery. Cooperative studies are carried out with HPL on storage of these vegetables, and with the University of Guelph and Agriculture Canada on controls for various pests and diseases.

PROJECT TITLE	RESEARCHER
HORTICULTURAL CROPS	
Fruit	
Apple cultivar evaluation	Elfving
Apple rootstock evaluation	Elfving
Apricot breeding and cultivar evaluation	Fisher
Breeding clingstone peaches	Miles, Wang
Breeding field resistance of peaches to canker disease	Miles
Breeding for a seasonal succession of firm-fleshed non-cracking self-fruitful black sweet cherry cultivars and determination of incompatibility group of selections	Tehrani

PROJECT TITLE	RESEAPCHER
Breeding for early maturing European and Japanese plums and pollen compatibility studies with plums	Tehrani
Breeding for wine grapes adapted to Ontario conditions	Fisher
Breeding sour cherry cultivars superior to Montmorency	Tehrani
Chemical thinning as a component of integrated pest management for apple	Elfving
Cold hardiness surveys with grapevines	Fisher
Comparison of productivity and growth of the late maturing advanced European plum selections and cultivars	Tehrani
Control of cytospora canker disease in peach	Miles
Coordinated small fruit trials in Ontario	Dale
Development of improved strawberry cultivars for fresh market and processing	Dale
Effects of nitrogen fertilization on dwarf apple trees	Elfving
Effects of plant growth regulators on apple	Elfving
Evaluation and development of analytical methods for determining the nutrient status of plant material	Cline
Evaluation of Bosc with seven quince dwarfing rootstocks	Tehrani
Evaluation of eight size-controlling quince rootstocks with compatible bartletts	Tehrani
Evaluation of prunus rootstock for peach	Miles
Evaluation of wild Fragaria virginiana clones for useful characteristics for cultivar breeding	Dale
Fertilizer and soil management studies with apple	Cline
Fertilizer and soil management studies with grapes	Cline, Fisher
Grape breeding for dessert cultivars adapted to Ontario climatic conditions	Fisher
Grape rootstock for vinifera cultivars	Fisher
Grape rootstocks — scion/rootstock combinations for non-vinifera cultivars	Fisher
Grape site suitability	Sayed, Fisher, Cline
Grapevine population studies in relation to yield and quality	Fisher
Growth and productivity of Japanese plum cultivars on different rootstocks	Tehrani
Growth regulators in the vineyard	Fisher

PROJECT TITLE	RESEARCHER
Influence of colt, mahaleb and mazzard rootstocks on the performance of montmorency and meteor tart cherries	Tehrani
Influence of colt, MXM14, P. mahaleb and P. mazzard rootstocks on productivity and growth of sweet and tart cherry cultivars	Tehrani
Influence of different selections of prunus mahaleb rootstock on productivity and growth to two tart cherry cultivars	Tehrani
Influence of rootstock on performance of advanced self-fruitful selections and standard sweet cherry cultivars	Tehrani
Influence of rootstock productivity and growth of European plum cultivars and early blue Vineland selections	Tehrani
Irrigation of size controlled apple trees	Elfving
Leaf removal of vinifera grapes to reduce Botrytis bunch rot and to improve quality	Fisher, Guttler
Management of small fruit crops	Dale
Management studies with Bartlett pear on quince rootstock	Tehrani
NC-140 cooperative sweet and tart cherry rootstock trials	Tehrani
Nitrogen and magnesium studies on plum	Cline, Tehrani
Orchard factors influencing apple fruit quality	Elfving
Peach and nectarine cultivar evaluation	Miles
Peach cultivar evaluation for canker resistance	Miles
Performance of Anjou, Bartlett and Bosc pear on standard and Old Home X Farmingdale clonal rootstocks	Tehrani
Propagation methods for peach trees	Miles, Chong
Rapid propagation of Sovereign Coronation grapevines	Fisher
Regional European plum cultivar and rootstock planting	Tehrani
Regional pear rootstock and cultivar trials	Tehrani
Replant studies with apple	Cline
Rootstock and training study with Anjou, Bartlett and Flemish Beauty pear cultivars on three quince rootstocks	Tehrani
Rootstock studies with Anjou, Bartlett, Bosc and Flemish Beauty cultivars on quince A and C	Tehrani
Soil management and fertilizer studies with Peach	Cline, Miles
Soil management irrigation and summer pruning interaction on Riesling/3309 grapevines	Fisher, Cline

PROJECT TITLE	RESEARCHER
Spacing trial with Bartlett pear on standard rootstock	Tehrani
Studies of the use of paper mill sludge	Cline
Trellised peach orchard studies	Miles, Cline
Training systems for grape cultivars	Fisher
Trickle irrigation studies for horticultural crops	Cline, Miles, Tehrani, Fisher
Vinifera cultivar and training combination trial	Fisher
Vinifera growers' survey	Fisher

Vegetables and Edible Fungi

Asparagus production and management	Schumacher
Biological control of mushroom fungus gnat	Rinker
Cole crop production and management	Schumacher
Cover cropping strategy for early potatoes	McKeown
Evaluation of vegetable seed coatings and seed enhancements	McDonald
Field tomato breeding	Brammall
Fresh market varieties of tomato for the fast food industry	Brammall
Garlic production and physiology	Schumacher
Greenhouse tomato breeding	Brammall
Greenhouse tomato crop management	Straver
Herbicide trials and wind abatement for muck vegetables	McDonald
Hydroponics for greenhouse vegetable production	Straver
Influence of cultivars and other factors of production on yield and quality of peppers	O'Sullivan
Management of muck soils	McDonald
Muck vegetable crop protection trials	McDonald
Muck vegetable cultivar evaluations	McDonald
Mushroom compost — substrate preparation and formulation	Rinker
Mushroom crop management — casing soil studies	Rinker
Mushroom crop management — response to supplementation	Rinker
Mushroom pest management — evaluation of pesticides	Rinker
New crop development	Schumacher
Onion, carrot and celery storage trials	McDonald

PROJECT TITLE	RESEARCHER
Pesticide residue monitoring of muck vegetables	McDonald
Potato management and physiology	McKeown
Production of alternate fungi	Rinker
Production practices for vine crops	O'Sullivan
Seedless greenhouse cucumber production	Straver
Seed potato management and physiology	McKeown
Seed potato production and management	McKeown
Tomato management and physiology	McKeown

Ornamentals

Apple pomace as amendment in container culture	Chong
A rapid technique for obtaining cytospora resistant peach plants	Chong, Miles, Svircev
Caliper ornamental nursery tree production using fieldgrown containers and trickle irrigation	Chong
Chemical protectants for roadside salt spray	Chong
Development of alstroemeria as a greenhouse crop	Blom
Effect of aerial and rooting environment on rooting of woody ornamental nursery crops	Chong
Evaluation of irrigation systems for containerized production	Blom
Evaluation of polyethylene films for greenhouse glazing	Blom
Factors influencing greenhouse poinsettia production	Blom
Fieldgrown fabric container culture	Chong
Growth of Euonymous in various media	Chong
Influence of growth substances on rooting of woody ornamentals	Chong
Influence of soil cooling on greenhouse freesia production	Blom
Micropropagation of new strawberry selections	Chong, Dale
Nursery tree culture in above ground wire basket containers	Chong
Propagation in plug trays	Chong
Roses on rockwool	Blom
Soil amendments for containerized nursery crops	Chong, Cline, Rinker
Timing of cinerarias through supplemental lighting	Blom

PROJECT TITLE	RESEARCHER
FOOD AND FOOD QUALITY	
Analysis of chemical and physical indexes of quality of juice, wine, and table grape cultivars and selections	Fuleki
Analysis of grape quality in Ontario	Chudyk
Anthocyanin pigment composition of horticultural crops grown in Ontario	Fuleki
Application of improved freezing methods on fruit and vegetables	Wang
Automated environment monitoring	Lauro
Celery storage — Development of technology for MA storage of Ontario-grown celery	Smith
Chemical fingerprinting of fruits	Fuleki
Colour quality problems in horticultural crops and their products	Fuleki
Controlled atmosphere storage of apples	Chu
Crucifer crop storage studies	Smith
Development of an ethylene measurement technique to determine apple harvest maturity	Chu
Development of a starch-iodine test guide for maturity evaluation of Ontario apples	Chu
Development of HPLC — based analytical methods for quality control in the food and beverage industry	Fuleki
Development of methods for measuring external and internal colour of fruits, vegetables and their products	Fuleki
Development of storage monitoring technology	Lauro
Energy aspects of storage	Lauro
Engineering aspects of food processing	Lauro
Improvement of cranberry growing in Ontario	Smith
Juice potential of commercial grape cultivars	Fuleki
Low ethylene storage of apples	Chu
Low oxygen storage of apples	Chu
Microbiology of storages	Chudyk
Onion storage studies	Smith
Processing of honey products	Wang
Processing quality studies on apricots	Wang
Processing quality studies on bell peppers	Wang
Processing quality studies on peaches	Wang
Processing quality studies on small fruit	Wang
Processing quality studies on tomatoes	Wang
Processing studies on stored peaches	Wang
Processing studies on strawberries	Wang
Quality monitoring techniques for processing tomatoes	Wang
Recovery of useful constituents from grape pomace and other fruit and vegetable processing plant waste material	Fuleki
Rootstock effects on harvest maturity of apples	Chu
Storage facility operation and management	Lauro
Storage studies on peaches for processing	Smith
Storage studies on stone fruit	Smith
Storage studies on strawberries for processing	Smith
Strawberries — Modified atmosphere packaging	Smith
Studies on cauliflower controlled atmosphere storage	Chu
Studies on controlled atmosphere storage of green bell peppers	Chu
Studies on Paclobutrazol effects on apple maturity and storage life	Chu
Technical and economic evaluation of fruit and vegetable storage systems	Lauro
Ultrafiltration and reverse osmosis in beverage technology	Fuleki
Utilization of surplus and waste fruit and vegetable materials	Wang
PEST MANAGEMENT AND DISEASE CONTROL	
Chemical induction of disease resistance for the protection of transplanted vegetable crops from soilborne pathogens	Brammall
Diseases of garlic	Brammall
The devevelopment of herbicide programs for various horticultural crops	O'Sullivan
Vegetable pathology	Brammall

KEMPTVILLE COLLEGE OF AGRICULTURAL TECHNOLOGY

Eastern Ontario has traditionally specialized in livestock and forage crops but, since the late 60's, farmers have dramatically expanded corn production. From the mid-70's, soybeans and other crops were added. The diversification has been stimulated largely by Kemptville College, which selected cultivars tailormade for the region and developed production methods to fit.

KCAT agronomists provide research committees with cultivar and management data from research trials on corn, soybeans, cereals and forages, along with regional recommendations on the safe application of herbicides and insecticides. Whenever possible, "growing naturally" is emphasized.

Horticultural research, which among other things stimulated the growth of pick-your-own operations and strawberry production, has also turned to ornamentals. One aim is to provide expertise for the burgeoning lawn and garden enterprises.

The Food Science and Technology Section has increased its research role of quality assessment of foods to include quality control and food safety.

Animal science research supports the $270 million milk industry of Eastern Ontario and the livestock sales that are a spin-off from that industry. The high producing dairy herd is maintained for education and demonstration as well as for research on nutrition and herd management. Among other achievements, calf researchers have developed a colostrum management program and enhanced heavy calf production and marketing across the Province.

PROJECT TITLE	RESEARCHER
LIVESTOCK	
Beef	
Application of an anti-stress supplement for new calf purchases	Drevjany
Comparison of alternative strategies for a more sustainable Holstein male calf production system	Drevjany
Effects of long-stem hay on performance of heavy calves	McKnight
Evaluation of chemical, physical and textural properties of veal and beef	Drevjany
Starter intake as a determinant of weaning schedule of purchased Holstein calves fed milk replacer	McKnight
Dairy	
Development of a quick quantitative method for the content of immunoglobulins in the blood of neonatal calves	McKnight
Investigation of installation cost and durability of four manger surfaces in a tie stall dairy barn	Wheeler
Using the DENCO test to establish the need for extra energy in high producing cows	Drevjany
FIELD CROPS	
Cereal production and management	Hoekstra
Field corn production and management	Curnoe
Forage production and management	Madill
Improving degraded soil structure	Curnoe
Oilseed production and management	MacDonald

PROJECT TITLE	RESEARCHER
HORTICULTURAL CROPS	
Fruit production and management	Morton
Maple plantation management	Langenberg
Vegetable production and management	Langenberg
FOOD AND FOOD QUALITY	
Binding and texture in restructured beef steaks	Johnson
Evaluating the chemical, textural and sensory sensory properties of veal and beef	Johnson, Reasbeck, Drevjany
Survey of the nutrient intake of patients with chronic obstructive pulmonary disease	Sanderson, Reasbeck, Munt
Thermal precipitation of proteins from milk whey blends	Hunter
ENGINEERING	
Investigation of transient nature ofhazardous conditions in swine barns caused by manure gases released during slurry mixing and removal	Clarke
Mole drainage and crop management	Cuthbertson
BUSINESS MANAGEMENT	
Capital investment decisions in the dairy industry	Matura

NEW LISKEARD COLLEGE OF AGRICULTURAL TECHNOLOGY

New Liskeard, the Ministry's most northerly college, has developed a comprehensive research program to assist farmers in this particular area. Crop testing sites have been developed in the districts of Rainy River and Thunder Bay to give farmers in the Northwest of the Province recommendations suitable to their conditions. An Agronomy Research Laboratory has been constructed as well on the New Liskeard campus, facilities which will enhance the research program there.

Research is carried out in beef cattle, field and horticultural crops, and farm management. The cow-calf herd was expanded recently to allow for a more wide-ranging program on nutrition, breeding efficiency, and feeding animals on pasture. This reflects the importance of this industry in Northern Ontario. Along with agronomic research, chiefly in barley, oats, and forages, horticultural studies in berries, sweet corn, and cole crops are helping farmers diversify.

PROJECT TITLE	RESEARCHER
LIVESTOCK	
Beef	
Pasture developement in northern Ontario	Gumprich, Sharpe
Dairy	
Stray voltage effects on dairy cattle	Gumprich
Sheep	
Comparison of cervical and trans-cervical articifical insemination in sheep	Sharpe
AGRICULTURAL ENGINEERING	
Natural air grain drying	Hawkins
FIELD CROPS	
Barley variety testing program	Skepasts, Rowsell
Effect of nitrogen application rate on oat, barley and wheat production	Skepasts, Rowsell
Field crop evaluation program for Northern Ontario	Skepasts
Intensive barley production	Skepasts
Oat variety testing program	Skepasts, Rowsell
Wheat variety testing program	Skepasts
Forage	
Forage grass cultivar evaluation program	Skepasts
Forage legume cultivar evaluation program	Skepasts
Gene pool corn test	Skepasts
Red clover seed production in Northern Ontario	Skepasts
Silage corn hybrid evaluation program	Skepasts

PROJECT TITLE	RESEARCHER
Oil and Protein Seed Crops	
Canola variety testing program	Skepasts
Field peas variety testing program	Skepasts
Flax variety testing program	Skepasts
Soybean variety testing program	Skepasts
HORTICULTURAL CROPS	
Biennial cropping of raspberries	Hughes
Chinese cabbage — preliminary trial	Hughes
Raspberry cultivar evaluation	Hughes
Strawberry cultivar evaluation	Hughes
The effects of floating row covers on seed potato production	Hughes
The effects of floating row covers on strawberry production	Hughes
The effects of plastic mulch on direct-seeded and transplanted cucumbers	Hughes
SOIL, WATER AND WASTER MANAGEMENT	
Nitrogen fertilization of canola in Northeastern Ontario	Rowsell
Residual nitrogren from various sources	Rowsell
Response of barley and alfalfa to limestone in Northern Ontario	Rowsell
To investigate the establishment, subsequent growth and erosion control potential of certain tree and shrub species on gully and stream banks	Skepasts
OTHER PROJECTS	
Evaluation of the quality of early generation seed potatoes produced by the Spud lab	Hughes

RIDGETOWN COLLEGE OF AGRICULTURAL TECHNOLOGY

About one-third of our agricultural production comes from Southwestern Ontario. It has the highest heat unit range in Canada, a favourable climate, and a broad selection of fertile soils. Research to assist this bountiful harvest has been going on at Ridgetown for 68 years, since its founding in 1922 as the Western Ontario Experimental Farm.

The swine program is the main focus of livestock research, but work is also carried out with beef and dairy cattle. The purebred Holstein herd is consistently the highest producing herd in Kent County.

Since 60% of the region's farmland is in field crops, chiefly soybeans, corn, and winter wheat, extensive testing and monitoring is done on varieties and corn hybrids in these crops. In horticultural crops as well, emphasis is placed on cultivar testing and management systems for efficient production. Pest management studies complement these studies.

Agricultural engineering research reflects this 'crop' mix with work on both livestock housing and tillage machinery and storage facilities. Soil researchers carry out work as well on tillage methods along with studies on windbreaks and shelterbelts, interseeding to halt soil degradation, and fertilizer application trials.

In the farm management area, Ridgetown's economists develop and refine financial and record-keeping methods easily adapted to individual farms, and analyze production systems and marketing strategies. The use of the computer in farming is an important part of this program.

PROJECT TITLE	RESEARCHER
LIVESTOCK	
Beef	
Computer software development, livestock enterprise models for profit and sundry software development analysis	Morris, Fitzgerald, DeSchutter
Evaluation of protein supplements for alfalfa and corn silage for growing steer calves	Fitzgerald
Swine	
Alternative welfare housing systems for breeding, gestating swine	Morris, Underwood
Causes of pre-weaning piglet mortality	DeSchutter
Controlled feeding programs for growing/finishing pig	DeSchutter
Evaluation of alternative feed stuffs for swine	DeSchutter
Investigations with mould contaminated corn	DeSchutter
Starter feeding program for young pigs	DeSchutter
Two-tiered rearing for growing pigs	Morris, Underwood
ECONOMICS	
Agricultural microcomputer distribution and service network study	Ross
Agricultural options usage versus alternative marketing methods	Doidge
Analysis of Ontario cash corn and soybean prices cycles	Doidge
Analysis of Ontario elevator buying/selling price spreads	Doidge
Development of a computertized budgeting and management aids for agriculture	Ross
Examination of the behaviour of cash prices fot finished feeder cattle and hogs by location and season	Dennison
Impact of the corn countervail duty on Ontario corn price determination process	Doidge
Impact of the goods and services tax and other tax policies on primary producers in agriculture	Ross
Livestock industry analysis	Dennison
Option usage for livestock vs. alternative marketing methods	Dennison
Potential for the use of computers and related electronics on the farm	Ross
ENGINEERING	
To determine the spray pattern of 80 and 110 spray nozzles under simulated field conditions	Underwood
To improve the application targeting of crop production chemicals	Underwood
Ventilation control in swine barns	Underwood
FIELD CROPS	
Grain	
Cereal management	Smid
Evaluation of cereal cultivar	Smid
Hybrid corn evaluation for grain and forage	McLaren
Production studies in grain corn	McLaren
Tissue analysis for nutrient content as affected by fertilizer and crop rotation	Johnston

PROJECT TITLE	RESEARCHER
Forage	
Forage varieties and management	McLaren
Oil and Protein Seed Crops	
Alterations of fatty acids in soybeans	Ablett
Cultural studies in field beans	Ablett
Cultural studies in soybeans	Ablett
Development and evaluation of soybean cultivars	Ablett
Evaluation of field bean types and cultivars	Ablett
HORTICULTURAL CROPS	
Fruit	
Cultivar evaluations in apples and tender fruit	Sikkema
Vegetables	
Breeding and cultivar evaluation of processing peppers	Loewen
Breeding and cultivar evaluation of processing tomatoes	Loewen
Cultivar evaluation of horticultural crops	Loewen
Cultural management studies in processing tomatoes	Sikkema
Cultural management studies in sweet corn	Sikkema
Management studies of various vegetable crops in the greenhouse	Sikkema
Tomato, pepper plug plant research	Pitblado
PEST MANAGEMENT AND DISEASE CONTROL	
Disease control in field crops	Schaafsma
Disease control in horticultural crops	Pitblado
Effect of herbicides on weed control and crop response in vegetable and fruit crops, transplanted and field seeded tomatoes, peppers, asparagus and fruit trees	Brown
Effect of herbicides on weed control and field corn	Brown
Evaluation of the resistance of malathion in populations of Indian meal moth in Southwestern Ontario	Schaafsma
Foliar insect control in field crops	Schaafsma
Herbicides in the control of specific weeds	Shaw
Insect and disease control in field tomatoes	Pitblado
Insect control in horticultural crops	Pitblado
Rearing European corn borers	Pitblado
Soil insect control in field crops	Schaafsma
Studies in the control of specific weeds	Brown
Weed control in beans	Shaw
Weed control in cereals and forages	Shaw
Weed control in vegetable crops	Shaw
Weed management systems in reduced-till field crops	Shaw
SOILS, WATER AND WASTE MANAGEMENT	
Agroforestry research in Southwestern Ontario	Nanni
Conservation tillage in Southwestern Ontario	Young
Crop rotation and cover crop effects on erosion control, tomato yields and soil properties in Southwesten Ontario	Johnston
Crop roatation effects on crop yield and soil properties in Southwestern Ontario	Young
Impact of soil compaction on the production of processing vegetables and other cash crops	Stevenson
Nitrogen research with corn using conservation tillage	Stevenson
Nitrogen research with winter wheat	Stevenson
Phosphorus and potassium soil test calibration research with corn	Stevenson
Phosphorus and potassium soil test calibration research with soybeans	Stevenson

UNIVERSITY OF GUELPH

For over a century, the Ontario Agricultural College, the Ontario Veterinary College, and since the 1960's, other Colleges at the University have run research programs on behalf of the Ministry. The nature of these programs has changed a great deal over the years, and the scope has broadened dramatically. New disciplines such as environmental biology, plant and animal biotechnology, and energy management have been introduced to complement traditional ones such as animal husbandry and horticulture.

In the early years, research and demonstrations were held on what is now the University campus. Now, much of this work has been moved to the seven experimental farms owned by the Ministry and run, under contract, by the University: Alma (aquaculture), Arkell (swine, poultry, engineering, environmental biology), Cambridge (horticultural crops, turf management, pest management), Elora (beef, dairy, field crops, soils), Guelph (agroforestry), Ponsonby (animal health), and Woodstock (field crops). The main areas emphasized in each of Guelph's agricultural research programs are listed below followed by the titles of current projects within each program.

PROJECT TITLE	RESEARCHER
LIVESTOCK	
Beef	
Bovine collagen metabolism	Ball
Characterization of the fibrolytic enzymes from bacteroides succinogenes.	Forsberg
Determining alternative fibre sources for central test station bulls using feed intake recording devices.	Wilton
Increasing the protein utilization in alfalfa/grass silages	Mowat, Buchanan-Smith
Dairy	
Antibodies as hormones: the use of anti-idiotypic antibodies to enhance animal performance	Walton
Comparison of dairy cows of high genetic merit for production with varying size.	Burnside, McBride, Burton
Effect of feeding varying doses of bambermycins (flavomycinR) on production responses, reproduction and health of dairy cows and heifers.	Burton, McBride
Effect of nutrition on reproduction of dairy bulls entered into A I units	Grieve, King, Buchanan-Smith
Effect of ration protein degradability on lactation response.	Grieve, Buchanan-Smith
Efficacy of recombinant growth hormone (rbGH) for lactating cows.	Burton
Evaluation of holstein-friesian A.I. sires for stillbirths and ease of calving.	Burnside, Schaeffer
Feeding strategies to enhance rumen function and productivity of dairy cows	Grieve
Genetic and environmental causes of immuno-globulin levels in Canadian dairy cattle	Burton, Wilkie, Burnside
Genetic manipulation of Bacteroides succinogenes to enhance fibre digestion in the rumen	Gibbins
Growth rates, composition and performance of dairy replacement heifers	Grieve, Buchanan-Smith, McBride
Is insufficient progesterone a cause of reproductive failure in dairy cows?	Walton, Leslie, King
Selection bias and animal evaluation methodology	Schaeffer, Kennedy
The effects of forage particle size and source of fibre on rumination and productivity on early lactating dairy cattle fed silage-based rations	Buchanan-Smith, Grieve, Allen
The effects of plant and fish protein in pre-ruminant calf diets on growth, health and immunological parameters	Burton

PROJECT TITLE	RESEARCHER
Swine	
An investigation of seasonal infertility of swine	Hacker
An investigation of the anabolic properties of polyamines in swine	Smith
Application of microwave technology to rearing young piglets	Morrison
Causes of stillbirths and improving piglet viability	Hacker
Effect of amino acid supplementation on stress, meat quality and body composition in swine	Ball
Effect of management parameters on dust and gas levels in a growing-finishing barn	Morrison, McKersie, Hacker, Ogilvie
Evaluation of porcine somatotropin (PST) for improved performance and carcass quality in finishing pigs	Hacker, Ball, Bowman
Exploitation of exogenous and endogenous growth regulators for pork production	Bayley
Factors affecting the fertility of boar semen	Buhr
Fat utilization in swine	Young
High levels of food intake, growth rate and efficiency of carcass deposition	Bayley
Influence of electronic feeding on sow reproduction	Hacker
Regulation of androstenone biosynthesis and control of boar taint	Squires
Regulation of reproductive function in pigs	King, Walton
Poultry	
Development of feeding systems for poultry	Leeson
Development of methods of gene transfer in domestic birds	Etches
Efficacy of growth promoters, antibiotics and anticoccidials for poultry	Leeson
Factors regulating the development of a single functional ovary in poultry	Squires
Investigation of the molecular basis for fatty liver hemorrhagic syndrome	Squires
Isolation, culture, and intraspecific transfer of chicken primordial germ cells	Etches
Isolation, identification and characterization of reproductive hormones in domestic birds	Etches
Lighting regimes for turkey toms	Etches
Measuring the behavioural needs of poultry	Duncan
Poultry egg production curves	McMillan
Salt reduction in processed poultry products	Barbut

PROJECT TITLE	RESEARCHER
The effects of non-traditional lighting on poultry behaviour and welfare	Duncan
The environment and efficiency of poultry production	Morrison
Biomedical Sciences	
3-Methylindole-induced pulmonary edema and metabolic basis of prolonged pulmonary disease in ruminants	Atwal
Actinides and estrogens as environmental contaminants in poultry	Robinson
Analysis of the intersex syndrome(s) in swine	Fisher, Partlow
Assessment of immunocompetent cells within the pregnant uterus	Croy
A study of the effects of levamisole on cellular responses to a respiratory virus in cattle	Conlon, Black
Brown adipose tissue: A physiological and biochemical study	Harris, Yamashiro
Dermal-epidermal and other interactions in differentiation and disorders of mammalian skin	Hardy-Fallding
Development of biotechnological methods of of embryo manipulation for advancement of the embryo transfer industry	Betteridge, Johnson, Croy, King, Wildeman
Development of the immune reconstituted SCID and SCID-beige mouse as a generally applicable model for veterinary and agricultural research	Croy, Valli, Yager, Stirtzinger, Percy, Etches, Betteridge, Boermans, Butler
Direct effects of glucocorticoids on porcine ovarian function	Liptrap
Immunopharmacological regulation of bovine inflammatory cells	Conlon
Investigation into effects of toxins on disease resistance of animals	Boermans
Metabolic and morphologic basis of pulmonary alveolar-capillary permeability and detoxification of metabolites	Atwal
Pharmacokinetic studies of drugs and chemicals in fish	Black, Ferguson
Plasma fibronectin in domestic animals	Gentry
Relaxin and blood pressure in pregnancy	Summerlee
Relaxin: Physiology and Pathophysiology (Gene Probe investigation of ruminant relaxin)	Porter
Steroid biosynthesis in the testes of the boar	Raeside
Study of biology of pregnancy establishment in horses	Betteridge
T Cell receptor genes in domestic animals	Croy

PROJECT TITLE	RESEARCHER
Testicular morphogenesis and subfertility related to twinning in cattle	Basrur
The embryonic genome and its expression during early development	King
The Hemostatic Mechanism in Cattle: Significance of the Factor XI Protein	Gentry
The pathogenesis of pasteurella haemolytica cytotoxin on bovine airway smooth muscle	Harris, Yamashiro
The role of sensory receptors and endocrine factors in controlling rumen function and food intake in ruminants	Grovum
The use of a GnRH antagonist to delay ovulation in superovulated holstein heifers and its effect on numbers, development and morphological quality of embryos	Rieger, Johnson, Walton
Vascular stress in swine	Downie
Pathology	
Actinobacillus pleuropneumoniae: the evaluation of a major toxin in pathogenesis and its use in treatment and control	Little
Definitive diagnosis of susceptibility to porcine stress syndrome: development of a cost effective protocol for clinical application	O'Brien, Lumsden
Development of a serological test and DNA probe to detect bovine immunodeficiency-like virus and their use in studies of prevalence and	Jacobs
Effects of PCB (Aroclor 1254) on the Cerical Apocrine Gland of Neonatal Mink pathogenicity	Hunter, Yager
Effects of ureaplasma diversum on bovine embryos: In vitro studies	Miller, Fernando
Enteritis complex in the commercial rabbit: A field study	Percy
Experimental Oncology	Valli
Histopathological study of normal and dead avian embryos and membranes	Julian
Host parasite interaction in the coccidia pathogenetic	Fernando
Immunopathogenesis of infection with bovine leukemia virus	Valli
Investigation into reproductive failure and normal mortality on mink ranches	Hunter
Investigation into respiratory disease in turkey	Hunter
Muscle steatosis in pigs	Hulland
Natural bone disease in sheep as a model for osteogenesis imperfecta in man	Hulland
Pathogencity of the H. somnus complex in the bovine	Little

PROJECT TITLE	RESEARCHER
Pathogenesis and immunity in Rhodococcus equi infections	Yager
Pathogenesis of bovine ocular squamous cell carcinoma	Stirtzinger, Valli, Livesey
Restriction endonuclease analysis of bovine leukemia virus genetic variants	Jacobs
Right ventricular failure and ascites in broiler and roaster chickens	Julian
SDA; An important coronavirus infection in the rat	Percy
Significance of neoplasia in wild fish populations	Hayes, Ferguson
Strongyles in equines: biology, pathogeneses, epidemiology and control	Slocombe
Studies on lameness and leg problems in broiler chickens and turkeys	Julian
Surveillance of diseases in laboratory animals	Percy
Surveillance of parasite diseases of domesticated animals in Ontario	Slocombe
The relationship of various health factors to milk composition and culling in dairy cattle	Jacobs, Leslie
Ureaplasma diversum as a cause of infertility in cattle	Miller

Population Medicine

A comparison of the effectiveness of two routes of Prostaglandin F2 for the induction of parturition in swine	Friendship
An epidemiological investigation of undifferentiated bovine respiratory disease in large feedlot-pen conditions	Meek, Martin
An epidemiological study of antibiotic residues in bulk milk from Ontario dairy farms	McEwen, Meek, Black
An epidemiological study of paratuberculosis in Ontario dairy cattle	Meek, Martin
An investigation of seasonal infertility of swine	Friendship, Hacker, Martin, Raeside
An observational study and survey to evaluate the prevalence and effects of Fusarial Mycotoxins on swine in Ontario	Wilson, Friendship
A proposal to investigate the economic and biologic efficacy of preconditioning beef calves	Martin
A software program for the management of health and productivity in an accelerated lambing system at the Ponsonby research station	Buckrell, Menzies, Walton
A study of the association of growth in height, weight and pelvic size with reproductive performance calving ease and productivity in Holstein heifers	Leslie, Bateman, Bonnett

PROJECT TITLE	RESEARCHER
A study of the relationship of gonadotrophin releasing hormone administered at breeding to herd reproductive performance	Leslie, Lissemore
A survey of the special fed veal industry	Luescher, Menzies, Waltner-Toews
Beefwatch: A spreadsheet to monitor cow-calf herd productivity	Martin, Bateman
Contaminants in livestock production: A review	Waltner-Toews, McEwen
Control of caseous lymphadenitis in a commercial dairy goat herd and protective immunity to C. pseudotuberculosis infection in sheep and goats	Muckle, Menzies
Development and implementation of an Ontario herd level IBR testing program	Martin, Lissemore
Embryo transfer and artificial insemination	Buckrell, Walton
Evaluation of a Pasteurella haemolytica vaccine/ bacterial extract (Presponse) for the prevention of UBRD in recently shipped feedlot calves	Bateman
Fertility in Beef Bulls	Johnson, Liptrap, Wilton, Bonnett, Buckrell, Etherington
Laparoscopic embryo transfer in sheep	Buckrell
Nocardia mastitis: The role of teat dipping and method of dry cow treatment in the occurrence of infection	Leslie, Lissemore, Barnum
Prevention of downgrading losses in turkeys	McEwen, Julian, Barbut
Project to identify and improve the health and productivity of Ontario beef cow-calf herd	Martin, Meek, Bateman
Sampling strategies in fish	Thorburn
Shepherds - Sheep Health & Productivity Herd Study — a project to identify and improve disease and management in Ontario sheep flocks	Menzies, Waltner-Toews, Buckrell, Physick-Sheard, Lumsden, Walton
Tail tip necrosis in beef cattle	Luescher, McKeown, Wilcock, Meek
The determination of the cause of early embryonic death and the identification of factors associated with early embryonic death and litter size	Martin, Wilson, Friendship, Kennedy
The effect of method of administration on the efficacy of dry cow therapy	Lissemore, Barnum, Leslie
The relationship between bulk milk culture results, management factors used in mastitis control, and herd prevalence of mastitis	Leslie, Muckle, Meek, Martin
The use of chemotherapeutics in the Ontario rainbow trout industry: present state and future concerns	Thorburn, Moccia

PROJECT TITLE	RESEARCHER
Veterinary Microbiology and Immunology	
A DNA probe for diagnosis of bovine viral diarrhea by in situ hybridization	Thorsen
A study of the occurrence, characteristics and significance of L-form variants of Staphylococcus aureus in bovine mastitis	Muckle, Leslie Menzies
Control of salmonella contamination of poultry products by vaccination of breeder flocks	Wilkie
Development and application of an improved serodiagnostic test for caprine arthritis encephalitis (CAE)	Thorsen
Development of a subunit vaccine for bovine adenovirus type 3	Thorsen
Development of fowlpox virus as a vector for live recombinant poultry virus vaccines	Derbyshire, Nagy, Krell
Diagnosis of parvovirus, transmissible gastroenteritis virus and rotavirus infections in swine	Johnson
DNA probes and monoclonal antibodies for detection of verotoxigenic E. coli from cattle	Gyles, Lam, Waltner-Toews, McEwen
Evaluation of a rapid automated bacterial identification/antimicrobial susceptibility testing system	Muckle
Genetic control of immune response and disease resistance in pigs	Wilkie
Host immune response to chlamydia psittaci	Shewen
Host resistance to pasteurella haemolytica	Shewen
Immune responses to oral vaccination of piglets with transmissible gastroenteritis virus	Derbyshire
Improved diagnostic and prophylactic procedures for the control of pleuropneumonia in Ontario swine	Rosendal
Leptospiral abortion in swine	Prescott
Molecular analysis of Actinobacillus Pleuropneumoniae virulence factors	MacInnes, Rosendal
Mycoplasma induction of tumor necrosis factor	Rosendal
Pathobiology of Mycoplasma iowae	Rosendal
Post-weaning E. coli diarrhea: detection of antigens for use in vaccines	Gyles
Purification of protective antigens of rhodococcus equi	Prescott
Role of serum resistance proteins in E. Coli mastitis	Muckle
Serological tests for Salmonella enteritidis in chickens	Gyles
Survey and control of Coxiellosis in dairy goats and dairy cattle	Lang
The biology of porcine interferons	Derbyshire
The prevalence and significance of viral infections of sheep in Ontario	Thorsen
The role of interferons and virus receptors in porcine transmissible gastroenteritis	Derbyshire
Verocytotoxins of porcine Escherichia coli	Gyles
Virulence and molecular epidemiology of infectious laryngotracheitis virus, a herpes virus of chickens	Nagy
Clinical Studies	
Abnormal bone growth in copper-deficient foals	Hurtig
Bovine viral diarrhea/mucosal disease: A study of prevalence and biological activity of the causal virus in infected herds	Baird, Thorsen
Cardiopulmonary effects of hypercapnia during constant volume controlled intermittent positive pressure ventilation (IPPV)in the horse	McDonell
Characterization and comparison of in vivo and in vitro airway responsiveness in recurrent airway obstruction	Viel, McDonell
Developmental orthopedic disease in hanoverian horses	Green, Hurtig
Establishing a herd health program for Ontario veal calves	Butler
Evaluation of a new approach to acid base balance Pascoe	Viel, Staempfli,
Field evaluation of a commercial M-protein vaccine (Strep Vax II®) in a feedlot for foals with epidemics of strangles	Staempfli, Prescott, Walter-Toews, Viel
Immunocytochemical identification of equine influenza virus and equine influenza virus and equine herpes virus type 1 in experimentally infected horses	Viel, Willoughby, Lang
Isolation of mycobacterium paratuberculosis in SCID mice	Butler
Microbial flora of the upper and lower airways of feedlot calves with undifferentiated bovine respiratory disease	Viel, Bateman
Peritoneal fluid analysis in periparturient mare	Trout, Meyers
Physiologic responses of calves to ACTH	Tremblay, Liptrap, Gentry
Refining the rabbit model to study mycobacterium paratuberculosis enteritis	Butler
Role of clostridium cadaveris in severe colitis in horses	Staempfli, Prescott

PROJECT TITLE	RESEARCHER
The possible involvement of relaxjn in porcine hypogalactia	Porter
Fish	
Brain neurotransmitters and food intake regulation in rainbow trout	Glanville
Development of a growth hormone assay for rainbow trout	Leatherland, Etches
Evaluation of metabolic processes occurring during accelerated growth in rainbow trout	Leatherland
Evaluation of the effects of administration of hormones on growth rate, blood and tissue comp. of rainbow trout	Leatherland
Fish Species Susceptibility to Yersinia ruckeri	Stevenson
Fish Waste Production — Rainbow Trout Culture	Chisholm
Gene Probe for Bacterial Kidney Disease of Fish	Stevenson
Gene Probe for Enteric Redmouth Disease of Fish	Stevenson
Gene Probe for Infectious Pancreatic Necrosis Virus of Fish	Stevenson, Dobos
Gill disease of fish	Ferguson
Preparation of monoclonal antibodies to salmonid pituitary hormones for development of hormone assays	Leatherland
Proteogenic effect of dietary leucine in skeletal muscle of rainbow trout	Smith
Rainbow trout spawning study	McMillan
Simulation of breeding programs in farmed salmonids	McMillan
The effect of polyamines on growth and food consumption of rainbow trout	Cowey
The requirement for sulfur amino acids and their metabolism by young rainbow trout	Cowey
The vitamin B12 requirement of young rainbow trout	Woodward
Use of triploidy induction in the improvement of Rainbow trout production traits	McMillan
Equine	
A field investigation of early embryonic mortality and non-pregnancy on selected breeding farms in Ontario	Meyers, Savage, Etherington, Bonnett
Articular cartilage transplantation in the horse	Hurtig
Evaluation of Synergistin (R) Treatment in Foals with Experimentally induced Bacterial Bronchopneumonia	Viel, Muckle, McDonell, Staempfli
Infectious respiratory diseases in horses: studies of the agents involved and methods for control	Willoughby, Viel, Thorsen
Temporary Bilateral Occlusion of the Common Carotid Artery	Livesey, Dyson, Atwal
Bees	
Honey Bee biology, management, and disease control	Scott-Dupree, Otis

ECONOMICS

Economics of agroforestry in Ontario's tobacco belt	Stonehouse, Penfold, Gordon
Economics of technological change in the livestock sector	Fox
Farm structure and performance in Canada	Brinkman
Management and behavioural characteristics of Ontarioh og farms. (Sub-project 2a)	Pletsch, Stonehouse, Brinkman
Management, behaviour and technology on Ontario swine farms	Howard, Brinkman Martin
Production opportunities on non-prime lands	Smit
Stewardship enhancement techniques for farm-level Stonehouse, soil conservation Hilts	Blackburn,
Systems analysis of pasture/cash crop rotations	Stonehouse, Clark,
The economic implications of technical barriers in the pork sector	Larue, Braga, Goddard
The economics of conservation tillage in southwestern Ontario	Fox Wilton
The economics of mastitis control practices on Ontario dairies	Howard, Meek, Leslie
The effectiveness of advertising milk in Ontario	Goddard, Funk
The impact of freer trade on the alcoholic beverage industry in Canada	Larue
The quantitative assessment of domestic and international trade policies	Meilke

ENGINEERING FOR ANIMAL AND CROP PRODUCTION

Air velocities in livestock buildings	Ogilvie
Bunker silo wall loads	Jofriet
Densities, pressures and capacities of barley silage in farm tower silos	Negi, Jofriet
Development of an on-farm alfalfa separating (fractionating) unit	Bilanski
Heat and moisture transfer through sprayed-on polyurethane insulation in high humidity environments	Jofriet
Heat-processing alfalfa while drying to increase its nitrogen availability to livestock	Bilanski

PROJECT TITLE	RESEARCHER
Hemicellulose utilization by yeasts: bioconversion of d-xylose to ethanol	Lee
Hydrogen sulfide monitor for swine facilities	Hayward

FIELD CROPS

Corn

Developn ent and evaluation of corn breeding techniques	Kannenberg, Kasha, Pauls
Evaluation of corn hybrids	Kannenberg
Development and improvement of corn breeding populations and inbreds	Kannenberg
Effects of crop sequence on soil structure, stability and productivity	Vyn
Effects of hybrid selection and management on grain corn quality	Vyn
Effects of tillage systems and wheel traffic on soil structure and corn response	Vyn
Identification of the physiological factors that limit corn dry matter accumulation	Tollenaar

Cereals

Breeding improved cultivars of oats	Falk
Breeding improved cultivars of spring barley	Falk
Breeding improved cultivars of winter barley	Falk
Breeding improved varieties of winter triticale	Hunt
Breeding new and improved varieties of winter and spring wheats	Hunt
Co-ordination of cereal production research in Ontario	Stoskopf
Cytogenetic studies in cereals	Kasha, Reinbergs, Hunt, Falk
Haploid production and utilization in cereals	Kasha, Falk, Hunt, Pauls
Molecular approaches to gene identification, isolation and transformation in cereals	Kasha
Production studies on barley and oats	Gamble
Testing new improved varieties of cereals	Hunt, Falk
Winterhardiness in cereals	McKersie

Forages

Application of tissue culture and molecular biology to alfalfa improvement	Pauls
Development and application of artificial seed technology in alfalfa	McKersie, Bowley
Forage cultivar evaluation	Bowley
Improvement of alfalfa quality	Bowley
Methodologies for sampling large round bales	Clark, Burton
Population development of forage legumes	Bowley
Seed production studies in forage and turf species	Gamble
Winter hardiness of Alfalfa	McKersie, Bowley

Pulses and Oilseed Crops

Common bean breeding and genetics	Michaels
Development and utilization of biotechnology for oilseed crop improvement	Pauls
Effect of genotype and environment on quality aspects of soybeans and rapeseed	Tanner, Hume, Beversdorf
Improving soybean nitrogen fixation and production efficiency	Hume
New management systems for common bean production	Michaels
Peanut breeding and genetics	Michaels, Tanner
Seed vigour of soybean and fieldbean	Gamble
Soybean breeding and evaluation	Tanner
Spring oilseed testing and management	Hume
Spring rapeseed breeding and evaluation	Beversdorf, Hume
Winter canola testing and management.	Hume
Winter rapeseed breeding and evaluation	Beversdorf, Hume

FOOD

A market and economic evaluation of merchandising aged and portion-sized beef	Martin, McBride, Braga, Usborne
An investigation of the major factors influencing the stability and quality of restructured meat products	Stanley
Automatic computer control and optimization of cyclone bioreactor system for acetic acid fermentation	Duitschaever
Characterization and nutritional assessment of oilseeds and processed vegetable oils from newly developed varieties of Ont. canola	Holub
Chill-injury in Ontario tomatoes	Stanley, Yada, Thompson, Murr
Evening primrose oil as a lipid source in 'humanized' infant formula	Glanville
Factors regulating the processability of Ontario potatoes	Yada, Lougheed, Stanley

PROJECT TITLE	RESEARCHER
Food components at subzero temperatures — the impact on food freezing and associated quality parameters	Goff
Formulation of milk and fermentation with strains of bifidobacterium and labtobacillus acidophilus	Duitschaever
Functional properties of whey fractions and their utilization in food systems	Goff
Improvement of the quality of sprout damaged wheat flours	Rasper
Improving the organoleptic quality of irradiated food	Yada, Ferrier
Investigation of the hard-to-cook defect in Ontario white beans	Stanley, Michaels
On-line sensors in processed food systems	Davidson
Ontario soybeans for direct human food use	Deman
Oxidative rancidity and flavour deterioration in meat products	Barbut, Draper
Post-mortem technology coupled with restructuring for low salt and fat processed meats	Mittal, Usborne
Potential toxicity from overheating vegetable oils	Alexander
Relationship between 016 steroid content in boars and palatability of pork chops	Gullett
Relationships between meat yield and meat quality	Swatland
Storage and cultural techniques to extend the postharvest life of apples	Lougheed
Storage procedures for selected vegetable crops as potential import replacements	Lougheed
Thermal precipitation of proteins from milk whey blends	Hill
The use of MDPM in further processed products	Barbut
Water-solubles as predictors of soft wheat quality	Hill

HORTICULTURAL CROPS

Vegetables

Asparagus variety improvement and cultural practices	Wolyn
Breeding and evaluating potato varieties for Ontario	Coffin
Evaluation of the nitrogen and boron nutrition of broccoli by analysis of transport fluid composition	Shelp
Incorporation of turnip mosaic virus resistance into rutabaga/rutabaga breeding	Shattuck

PROJECT TITLE	RESEARCHER
Physiological and biochemical mutants of nitrogen assimilation in the nodulated legume	Shelp, Michaels Shattuck
Responses of vegetable crops to industrial pollutant stress	Ormrod
The nutritional requirements of cauliflower with special reference to incidence of black speck and brown-hollow stems	Riekels

Tree Fruits and Small Fruits

Production techniques for tree fruits, particularly apple	Proctor
Raspberry Breeding	Sullivan
Strawberry Breeding	Sullivan
Strawberry Management	Sullivan

Ornamentals

Environmental influence on water status of greenhouse roses	Dixon
Plant-environment interactions in greenhouse roses	Tsujita, Murr, Thompson, Dixon, Grodzinski
Physical, chemical & environmental parameters in container growing	Lumis
Recirculation nutrient solution systems and flower crop nutrition	Tsujita
The influence of cultural practice on landscape trees	Lumis

Turfgrass

Competitive ability of turfgrasses	Eggens
Fate and persistence of pesticides used on turf: chemical and non-chemical control of weeds in turf	Hall, Stephenson
Turfgrass Cultivar Evaluation	Eggens
Turf renovation	Eggens
Nutrient requirements and response of turf to fertilizers	Bates

PEST MANAGEMENT & DISEASE CONTROL

Plant Diseases

Biocontrol of grey mold fruit rot of strawberries	Sutton
Diagnostic methods for the bacterial plant pathogen Clavibacter michiganese	Trevors
Fungal parasites of nematodes	Barron
Molecular basis of plant-pathogen interactions	Goodwin

PROJECT TITLE	RESEARCHER
Insects	
Arthropod and vertebrate pest control as related to livestock and poultry	Surgeoner
Biology and control of insects affecting the production of forage and field crops	Ellis
Biology of orchard insects	Laing
Bionomics of hemiptera parasitoids (phasiinae: tachinidae)	Marshall
Biosystematics of decay-related diptera	Marshall
Control of the onion maggot	McEwen
Insect pests of vegetable crops	Sears
Management of insect pests of potato	Sears
Pesticides for minor crops	McEwen
Physiological and behavioural studies on production and management of beneficial arthropods	Schmidt
Weeds	
Berry crop weed control	Cain, Sullivan
Biological control of weeds	Alex
Environmental fate of herbicides and other pesticides	Stephenson
Evaluation of new herbicide treatments for control of weeds in field crops	Anderson, Swanton, Swanton
Physiology and biochemistry of herbicide selectivity in plants	Stephenson
Triazoles as plant growth regulators and protectants	Fletcher
Weed control in conservation tillage	Swanton

SOIL, WATER AND WASTE MANAGEMENT

PROJECT TITLE	RESEARCHER
Agrometeorology	
Acquisition and compilation of agroclimatological data	King, Gillespie
Effects of elevated atmospheric CO2 concentration on yield and water use efficiency of crops in the field	King, Kidd
Forage quality as affected by atmospheric drying conditions and rainfall	Brown
Investigation of planetary boundary layer models to estimate regional-scale climates	Gillespie, Thurtell
Measurement and estimation of crop micro-climates for pest management	Gillespie
Scheduling irrigation for optimum water use and yield of potatoes	Brown, Coffin, Dixon
Turbulent diffusion processes and trace gas detection	Thurtell, Kidd
Streamwater Management in Agricultural	
Control of soil erosion and associated water pollution	Dickinson, Rudra
Nitrate concentrations in shallow groundwater as influenced by application rates of nitrogen	Whiteley
Riparian forest plantations for wood production, soil erosion control and stream rehabilitation	Kaushik, Gordon
Sources of contamination in outflow from tile drains	Whiteley
Agricultural Land Use	
An evaluation of crop residue monitoring utilizing satellite data	Protz
An evaluation of the economic viability of rehabilitating severely-eroded croplands	Stonehouse, McBride
Characterization of soil compaction and its agronomic significance	McBride, McBride
Developing a local land evaluation system	Taylor, Brown
Development of a land rating index for agricultural performance in Ontario	Mage
Development of an index of soil quality	Protz
Development of a rating system to evaluate agricultural land at the local level - phase II	Hilts, McBride, Brown
Evaluation of agricultural drainage for land capability ratings	Van Vuuren
Evaluation of Land Stewardship Program.	Van Vuuren
Impact of farm tenancy on agricultural land use Land rating for agriculture	Van Vuuren, Smit
Implementation of landsat and spot satellite resource data into a microcomputer based county level geographic information system	Protz
Land evaluation for local agricultural land use policy	Penfold
Relationship between soil quality and land conversion cost	Van Vuuren
Socio-economic factors in local land rating	Rodd, Penfold
Crop and Soil Management	
Charge characteristics of Ontario soils	Evans
Crop residue management and phytotoxin effects under conservation tillage	Voroney
Development and evaluation of methods for prediction of macro/micronutrient requirements of crops	Bates

PROJECT TITLE	RESEARCHER
Development of a riser inlet	Dickinson, Rudra
Evaluation of a nitrogen soil test and the fate of fall applied N	Beauchamp, Kachanoski
Evaluation of soil additives for erosion control	Groenevelt
Forage systems as nitrogen sources in crop production	Sheard
Identification of soil management and cropping practices which sustain the capability of a soil to accept, cycle and store organic matter	Voroney
Manure N availability to corn	Beauchamp
Methods of application of fertilizer at planting for corn in conservation tillage systems	Miller
Modelling the quality of surface and tile drainable water	Rudra, Dickinson
Protein Enhancement Winter Wheat Through Nitrogen use	Sheard
The relative importance of disease and insect control on alfalfa production	Sheard, Ellis, Boland
Use of sewage sludge on agricultural land with emphasis on plant availability of heavy metals	Bates

SPECIAL PROJECTS

PROJECT TITLE	RESEARCHER
Development of DNA probes for the identification and quanitification of verticillium albo-atrum and verticillium dahliae in alfalfa	Robb, Nazar, Boland
Intercropping of black walnut with agricultural crops in Southern Ontario	Gordon

Bibliography

This bibliography lists all publications resulting from research completed during the period April 1, 1989 to March 31, 1990. The publications report on research programmes and projects approved by the Agricultural Research Institute of Ontario and funded completely or in part by the Ontario Ministry of Agriculture and Food.

AGRICULTURAL ENGINEERING SERVICES

PERIODICALS

Bird, N.A., 1990. "Building Renovation". *Ontario Hog Farmer.* Nov.

Brunet, L.M., 1990. "Le Service de Genie Agricole du M.A.A.O.". *Agricom.* February 5.

Choiniere, Y., 1989. "Automate Sidedoors Not Ridge Vents". Collaboration with Marilyn Crabbe, *Country Guide.* April. Pp. 69.

Choiniere, Y., 1989. "Making Naturally Ventilated Barns Work". Special collaboration with Marilyn Crabbe, *Hog Guide from the Country Guide.* May. p H-3,4.

Choiniere, Y., 1989. "Natural Ventilation for Livestock Housing: Research and Facts". Presented to Ontario Hydro to include in their *Facts on Barn Ventilation.* Sept.

Choiniere, Y., 1989. "Steel Trusses Support These Barns" and "Quiet Barn Area". Collaboration with Marilyn Crabbe, *Dairy Guide from the Country Guide.* August. Pp. D20-21.

Choiniere, Y. and Munroe, J.A., 1989. "La Ventilation Naturelle Pour Le Logement Animal: Recherche et Developpement". *Agricom.* Vol. 7. No. 2. Pp. 18. Sept.

Choiniere, Y. and Munroe, J.A., 1989. "Quality Air Via Natural Ventilation". *OMAF NEWS.* November-December. Pp. 9.

Clarke, S.P., 1989. "Is Your Water Fit For Man or Beast". *Holsteins Now Magazine.* May-June. Vol. 2 Issue 4.

Clarke, S.P., 1990. "Removing Asbestos Products". *Lanark Notes.* March.

Fraser, H.W., 1989. "Comparing Irrigation Costs for Tree Fruits". *Niagara Update.* Information for Fruit Growers. June.

Fraser, H.W., 1989. "Do you Know Where Your Drainage Tiles Are". *Niagara Farmers Monthly.* August.

Fraser, H.W., 1989. "OMAF Agricultural Engineering Extension Information". *Niagara Farmers Monthly.* November.

Fraser, H.W., 1989. "The Stressful Life of a Two-Story Bank Barn". *Niagara Farmers Monthly.* April.

Fraser, H.W., 1990. "Costs of Refrigerated Storages for Peaches". *Niagara Update.* Information for Fruit Farmers. February.

Fraser, H.W., 1990. "Is Condensation Destroying Your Farm Building". *Niagara Farmers Monthly.* February.

Huffman, H.E., 1989. "Case Study — Heavy Air With Unstable Temperature". Ontario Hog Farmer. Fall Issue. Pp. 44.

Huffman, H.E., 1989. "Case Study — Too Much Air Circulation". *Ontario Hog Farmer.* Winter Issue.

Huffman, H.E., 1989. "Choosing Best Unit Heater". *Hog Market Quarterly.* Fall Issue. Pp.54.

Huffman, H.E., 1989. "No More Sleeping In The Kitchen". *Hog Market Place Quarterly.* Winter Issue. Pp. 16.

Huffman, H.E., 1990. "Case Study — Inappropriate Wiring in a Weanling Room". *Ontario Hog Farmer.* Spring Issue.

Huffman, H.E., 1990. "Case Study — Thermostat Wired Backwards". *Ontario Hog Farmer.* Early Summer Issue.

Huffman, H.E., 1990. "Layout Cuts Stress". *Hog Market Place Quarterly.* Spring Issue. Pp. 34.

Huffman, H.E., 1990. "Summer Air Flow". *Hog Market Place Quarterly.* Summer Issue.

Kains, F.A., 1989. "Case Study — Fan Location Causing Drafts". *Ontario Hog Farmer.* Fall.

Kains, F.A., 1989. "Case Study — Handling Dirty Pens in Finishing Barns". *Ontario Hog Farmer.* Spring.

Kains, F.A., 1989. "Dirty Pens in Winter — Case Study". *Ontario Hog Farmer.* Winter.

Kains, F.A., 1989. "How To Improve Winter Airflow". *Hog Market Place Quarterly.* Winter.

Kains, F.A., 1989 "Innovation Contest Innovates". *Hog Market Place Quarterly.* Spring.

Kains, F.A., 1989. "Insect Foggers Smoke Out Air Patterns". *Hog Market Place Quarterly.* Spring.

Kains, F.A., 1989. "Understanding Static Pressure". *Hog Market Place Quarterly.* Fall.

Kains, F.A., 1989. "Ventilation System Alternatives For Small Room Ventilation". Proc. *Centralia Swine Research Review Day.* 1990.

Kains, F.A., and Richards, D., 1990. "Rules For Entry to Innovation Competition, Ontario Pork Congress". *Ontario Hog Farmer.* Spring.

Myslik, J.P., 1989. "Irrigation Design Binder". For OMAF engineers.

Myslik, J.P., 1989. "Soil & Water Curriculum for C.A.T. Colleges — water supply and drainage section".

Sojak, M., 1989. "Severances". *General Farm Press*

Sojak, M., 1989. "Ventilation Co-operation". *OMAF News*

Stone, R.P., 1989. "Storing Pesticides on the Farm". *OMAF News.* (In press).

Wheeler, B., Clarke, S.P. and Milne, B., 1989. "No Dogs in these Mangers". *Highlights of Agricultural Research in Ontario.* March. Vol. 12. No. 1.

PROCEEDINGS

Bird, N.A., 1989. *Seventh Poultry Management School.* "Poultry Manure Handling Systems", "Building Construction". University of Guelph, Guelph. June.

Bradshaw, S.H. and Fleming, R.J, 1989. "On Farm Experience with an Electronic Sow Feeding System". *Am. Soc. of Agr. Eng.*, Paper No. 89-4069, St. Joseph, MI.

Brown, D.M., Singh, G. and Jung, R., 1989. "Scheduling Irrigation or Potatoes Using a Crop Growth Model". *Amer. Soc. of Agr. Eng.* Paper No. 89-2686. New Orleans, Louisana. Dec. 14.

Choiniere, Y., Munroe, J.A. and Blais, F., 1989. "Winter Performance of Different Air Inlets in a Warm Naturally Ventilated Swine Barn". CAE. Vol. 31. No.1. Pp. 51-54.

Choiniere, Y., Munroe, J.A., Desmarais, G., Dubois, H. and Renson, Y., 1989. "Effect of Different Ridge Opening Widths on the Thermal Performance and Ventilation Rate of a Naturally Ventilated Swine Building During Warm Summer Conditions". *Cdn. Soc. of Agr. Eng.* Paper No. 89-4065.

Fleming, R.J. and Ogilvie, J.R., 1989. *Am. Soc. of Agr. Eng.*, "An Expert System on Swine Manure Management". Paper No. 89-4091 "Development of a Rating Scheme for Manure Management Systems". Paper No. 89-4092, St. Joseph, MI.

Hilborn, D.R., 1990. "Erosion Control Structures and Micro Drainage". *Sixteenth Annual Ontario Horticultural Crops Conference.* Toronto. February.

House, H.K., Jofriet, J.C. and Otten, L., 1989. "Moisture Distribution and Thermal Behaviour of Sprayed-On Polyurethane Insulation in High Humidity". *Am. Soc. of Agr. Eng.* Paper No. 89-4030 ASAE/CSAE, Quebec City, Quebec.

Huffman, H.E., 1989. "Field Evaluation of Electronic Controller for Heaters in Livestock Barns". *Amer. Soc. of Agr. Eng.* Paper No. 89-4531. ASAE Winter Meeting, New Orleans, Louisiana. Dec.

Huffman, H.E., 1989. "Is Your Barn the Weakest Link?" *OMAF Weakest Link Series 1989 Seminar.*

Huffman, H.E., 1990. "Electronic Thermostats — An Overview". *Centralia College Swine Research Update.* Jan.

Huffman, H.E., 1990. "New Ideas — History Repeats Itself". *Swine Day,* Grey-Bruce Farmers Week. Chelsey. Jan.

Jiang, S., House, H.K. and Jofriet, J.C. 1989. "Gamma-Spectrometry for Moisture Determination of Polyurethane Foams". *Amer. Soc. of Agr. Eng.* Paper No. 89-1629 ASAE Meeting. New Orleans, Louisiana.

Jung, R. V., 1989. "Scheduling Irrigation Using a Personal Computer". *Can. Soc. of Agr. Eng.* Ontario Region. Poster Session. April 17.

Kains, F.A., 1990. "Ventilation of Smaller Swine Herds for the Mixed Practice Veterinarian".

Turnbull, J.E., Kains, F.A. and Wolynetz, M.S., 1989. "Comparison of Fresh Air Inlets in Small Livestock Rooms". *ASAE* Winter Meeting. Paper No. 89-4522 '89.

Toombs, M.R. and Bellman, H.E., 1989. "Silo Selection Expert System". *ASAE and CSAE* Joint Summer Meeting, Paper No. 89-7043. June.

BOOKS, THESES, REPORTS

Bird, N.A., 1989. *Update On Poultry Housing Specialty.* Report presented at OMAF A.E.S. In-Service Training Conference, Huron Park, June.

Bird, N.A., 1990. *Light Restricting Fan Houses and Air Inlets.* CPS Leaflet No. M-5911 Research Branch. Agriculture Canada.

Bird, N.A. and Huffman, H.E., 1989. *Revised Report on Livestock Environmental Control Section of Agricultural Structures Curriculum Outline.* June.

Choiniere, Y., 1989. *Natural Ventilation of Low Rise Buildings by the Wind; Development of a Model to Predict Average Ventilation Votes and the Frequencies of Consecutive Hours Below Minimum Limits of Ventilation Rate With Summer Meteorological Data.* Report presented to D.H. Tanaka, Civil Engineering, Ottawa University, April.

Choiniere, Y., and Munroe, J.A., 1989. *Natural Ventilation for Livestock Housing.* Final Report, OMAF Research Funds. September.

Choiniere, Y., Tremblay, A., Tremblay, S., and Munroe, J.A., 1989. *Potential Energy Savings of Natural Ventilation versus Mechanical Ventilation for Livestock Housing in Ontario.* For Ontario Hydro, Research Project, Final Report, December.

Choiniere, Y., Tremblay, A., Tremblay, S. and Munroe, J.A., 1990. *Guidelines for Natural Ventilation of Swine Housing in Ontario". Ontario Pork Producers.* Marketing Board, Interim Progress Report, March.

Clarke, S.P., 1989. *Nutrient Value of run-off Storages.* Report presented at OMAF In-Service Training, Huron Park, June.

Clarke, S.P., 1989. *Report of Structures and Environment Research and Service Subcommittee* of the OMAF Engineering Research and Services Committee Major Report.

Clarke, S.P. and Patni, N., 1989. *Transit Nature of Hazardous Conditions in Swine Barns Due to Manure Gases Released During Slurry Mixing.* Interm Report.

Fraser, H.W., 1989. *Comparing the Costs of Irrigation Using Trickle/Stationary Overhead Guns/Travelling Overhead Guns, for Tree Fruits in 1989.* April.

Fraser, H.W., 1989. *Fruit & Vegetable Conditioning/Storage/ Equipment Specialty Update.* In-Service Training, CCAT. May.

Fraser, H.W., 1989. *Measuring & Recording High Humidity Levels in Refrigerated Fruit & Vegetable Storages.* May.

Fraser, H.W., 1989. *Retrofitting Your Refrigerated Peach Storage for Forced Air Rapid Cooling., Sizes, Costs & Sources of Information for Refrigerated Storages for Tender Fruit Tree Crops.* Papers presented at the Niagara Peninsula Fruit & Vegetable Growers Annual Meeting. St. Catharines. November.

Fraser, H.W., 1990. *Comparing the Cooling Capabilities of Twelve Ontario Asparagus Receiving Stations.* Report prepared for the Ontario Asparagus Marketing Board. March.

Fraser, H.W., 1990. *Manure Storage Costs for Broiler Producers.* Paper presented at the Analyzing Building Profitability Meeting for Broiler Producers. Smithville. January.

Garland, G.A., 1989. *C.P.S. Ontario Report.* Report to the Canada Plan Service Management Committee. September.

Garland, G.A., 1989. *Installation Recommendations for a Milk Pipeline.* OMAF Factsheet Agdex 410/725 (89-118).

Garland, G.A., 1989. *Maintenance of Milking and Milk Handling Equipment.* OMAF Factsheet Agdex 410/725.

Garland, G.A., 1989. *Ontario Report to Canada Committee on Engineering Services in Agriculture and Food.* Report presented at annual meeting CCESAF. November.

Garland, G.A., 1989. *Proper Milking Procedures.* OMAF Factsheet Agdex 410/725 (89-168).

Garland, G.A., 1989. *Understanding the Basics of Milking Machines.* OMAF Factsheet Agdex 410/725 (89-103).

Garland, G.A., 1990. *Ontario Agriculture and Food Research Engineering Research and Services committee minor report.* Report to the Ontario Agricultural Services Coordinating Committee. January.

Hilborn, D.R., 1989. *Small Diameter Information Sheet.* Report for AES, U of G and Drainage Contractors, May.

Hilborn, D.R., 1989. *Update re Small Diameter Tile.* Report for Small Diameter Demo Days, September.

Hilborn, D.R., 1989. *Water and Sediment Control Basin Design Program.* Users guide for computer program, December.

Hilborn, D.R., 1990. *Cattle Access Control.* Report presented at series of Farming for the Future Seminars, January.

Hilborn, D.R., 1990. *Handling Milkhouse Wastes.* Report at series of Farming for the Future Seminars, January.

Hilborn, D.R., 1990. *Maximizing Manure Value and Minimizing Compaction and Runoff.* Report presented at series of Farming for Future Seminars, January.

Hilborn, D.R., 1990. *Update re Mitchell Small Diameter Tile Project.* Report to Wentworth Soils and Crops Association, January.

House, H.K., 1990. *Thermal Behaviour of Sprayed-On Polyurethane Foam In High Humidity.* Masters Thesis, University of Guelph, Guelph. March.

Huffman, H.E., 1989. *Environmental Control for Livestock Buildings Update.* For AES Conference. May.

Huffman, H.E., 1989. *Report to CSA concerning Technical Committee on Electric Farm Barn Heaters and Ventilating Fans.* October.

Huffman, H.E., 1989. *Summary of Ventilation and Heating Schools.* For OPIIP Staff meeting, April.

Huffman, H.E., 1989. *Technical Poster and Summary Report on Heater Control Research.* For CSAE Poster Session. April.

Huffman, H.E., 1990. *Report regarding the current status of CSA Standard on Performance of Ventilating Fans for Use in Livestock and Poultry Buildings.* Feb.

Kains, F.A., 1989. *Heat Loss From Pigs.* Paper for part of masters program in Advanced Heat and Mass Transfer Course, University of Guelph.

Kains, F.A., 1990. *Expert Systems and Their Application to Agricultural Engineering.* Paper for Intelligent Systems course, part of masters program, University of Guelph.

Stone, R.P., 1989. *Soil and Water Curriculum-Irrigation and Soil Conservation Structures Sections.* Report to C.A.T. Colleges Education Section.

Stone, R.P., 1989. *Soil and Water Engineering Research Subcommittee Report.* Report to the Ontario Agriculture and Food Engineering Research and Services Committee, October 1989.

Stone, R.P., 1989. *Trickle Irrigation Design Sheet.* Presented at O.M.A.F. A.E.S. In-Service Training Conference, Huron Park, June 1989.

Stone, R.P., 1989. *Update on Soil Erosion Control Specialty.* Report presented at O.M.A.F. A.E.S. In-Service Training Conference, Huron Park, June.

Stone, R.P., 1989. *Water and Sediment Control Basins.* O.M.A.F. Factsheet. Agdex 751 : 89-167.

Stone, R.P., 1990. *Evaluation of Soil Erosion Control Structures.* Report to Erosion Control Contractors and O.M.A.F. Staff. February.

Stone, R.P., Gaunt, D., 1989. *Pesticide-Handling Facility.* Plan prepared for distribution to O.M.A.F. Staff, M.O.E., Farmers, Agri-business, etc. October.

Toombs, M.R., 1989. *Building New Sheep Barns.* Report presented to Sheep Focus, Lindsay, August.

COMPUTER PROGRAMS

Fleming, R.J., 1989. *M-CLONE : Swine Manure Management Expert System.*

Hilborn, D.R., 1990. *Design of Water and Sediment Control Basin.* A comprehensive computer program capable of complete design, costing and graphical analysis.

Johnson, J.W., 1989. *Drop Inlet Design.* A design aid for soil conservation work.

Toombs, M.R., 1989. *Silo Selection Expert System.*

VIDEOS

Jones, D.A., 1989. Swine manure systems, video in series on swine housing by Purdue University prepared for satelite broadcast.

AGRICULTURAL LABORATORY SERVICES

PERIODICALS

Birmingham, B., Thorpe, B., Frank, R., Clement, R., Tosine, H., Fleming, G., Ashman, J., Wheeler, J., Ripley, B.D. and Ryan, J.J., 1989. "Dietary intake of PCDD and PCDF from food in Ontario, Canada." *Chemosphere* 19:507-512.

Braun, H.E., Frank, R. and Ritcey, G.M., 1989. "Removal of pyrazophos from treated fabric using household laundering." *Bull. Environ. Contam. Toxicol.* 42:687-690.

Braun, H.E., Frank, R. and Ritcey, G.M. 1990. "Removal of organophosphorus, organochlorine and synthetic pyrethroid insecticides and organochlorine fungicides from coverall fabric by laundering." *Bull. Environ. Contam. Toxicol.* 44:92-99.

Frank, R., 1990. "The food safety debate." *Canadian Fruitgrower,* Feb. 1990.

Frank, R. and Braun, H.E., 1989. "PCB and DDE residues in milk supplies of Ontario, Canada 1985-1986." *Bull. Environ. Contam. Toxicol.* 42:666-669.

Frank, R., Braun, H.E., Clegg, B.S., Ripley, B.D. and Johnson, R., 1990. "Survey of farm wells for pesticides, Ontario, Canada, 1986 and 1987." *Bull. Environ. Contam. Toxicol.* 44:410-419.

Frank, R., Braun, H.E., Ripley, B.D. and Clegg, B.S., 1990. "Contamination of rural ponds with pesticide, 1971-85, Ontario, Canada." *Bull. Environ. Contam. Toxicol.* 44:401-409.

Frank, R., Braun, H.E., Ritcey, G. and Stanek, J., 1989. "Pyrazophos residues from treated greenhouse and growth chamber grown chrysanthemums." *Can. J. Plant Sci.* 69:961-966.

Frank, R., Suda, P. and Luyken, H. 1989. "Cadmium levels in bovine liver and kidney from agricultural regions on and off the Canadian Shield, 1985-1988." *Bull. Environ. Contam. Toxicol.* 43:737-741.

Goldstein, D.A., McGuigan, M.A. and Ripley, B.D., 1988. "Acute tricresylphosphate intoxication in childhood." *Human Toxicol.* 7:179-182.

Ritcey, G., McEwen, F.L., Frank, R. and Ripley, B., 1989. *Abstrs. in Pesticide Residue Report 1989, Exp. Comm. on Pesticide Use in Agric.* "Fungicide residue in green peppers." Pp. 283., "Fungicide residue in onions as a result of foliar treatment." Pp. 285.

PROCEEDINGS

Braun, H.E., Frank, R., Ripley, B., Ritcey, G. and McEwen, F.L., 1989. "Pesticide residue in lettuce." *Abstrs. in Pesticide Residue Report 1989, Exp. Comm. on Pesticide Use in Agric.* Pp. 284.

Frank, R., Ripley, B., Ritcey, G. and McEwen, F.L., 1989. "Residue in parsnips." *Abstrs. in Pesticide Residue Report 1989, Exp. Comm. on Pesticide Use in Agric.* Pp. 286.

McDonald, M.R., Edgington, L.V. and Ripley, B., 1989. *Abstrs. in Pesticide Residue Report 1989, Exp. Comm. on Pesticide Use in Agric.* "Evaluation of fungicide seed dressings for the control of cavity spot of carrot — 1987." Pp. 175., "Evaluation of metalaxyl rates and the time of application for the control of cavity spot of carrot — 1987." Pp. 176.

Ripley, B.D., 1988. "Pesticide analysis and water quality studies, in agricultural chemicals and water quality in Ontario." *Proc. Workshop Ontario Water Management Research and Services Committee,* Nov. 17-18, Kitchener, J.A. Stone and L.L. Logan, editors.

Ripley, B.D., 1990. "Tracking human exposure to pesticide residue in the field." *Highlights* 12:(2)29.

Ripley, B.D., Frank, R., Braun, H.E., Ritcey, G. and McEwen, F.L., 1989. *"Pesticide residue in Celery." Abstrs. in Pesticide Residue Report 1989, Exp. Comm. on Pesticide Use in Agric.* Pp. 281.

Ritcey, G., McEwen, F.L., Frank, R. and Braun, H.E. 1989. *Abstrs. in Pesticide Residue Report 1989, Exp. Comm. on Pesticide Use in Agric.* "Insecticide residue in cucumbers." Pp. 282., "Insecticide residue in tomatoes." Pp. 293.

Ritcey, G., McEwen, F.L., Frank, R., Braun, H.E. and Ripley, B., 1989. *"Pesticide residue in tomato." Abstrs. in Pesticide Residue Report 1989, Exp. Comm. on Pesticide Use in Agric.* Pp. 292.

BOOKS

Frank, R. and Ripley, B.D. 1990. *Food residues from pesticides and environmental pollutants.* Chapter 15, Pp. 473-524. Food Contamination from Environmental Sources. Ed. J.O. Nriagu and M.S. Simmons. Vol. 23. Advances in Environ-mental Science and Technology. Publish. John Wiley & Sons Inc., New York.

ALFRED COLLEGE OF AGRICULTURE AND FOOD TECHNOLOGY / COLLEGE DE L'AGRICULTURE ET DE L'ALIMENTATION D'ALFRED

PERIODICALS

Choinière, Y. and Munroe, J.A., 1989. "La ventilation naturelle pour le logement animal: Recherche et développement." *Agricom*. Vol. 7. No. 2. Pp. 18. Septembre.

Choinière, Y. and Munroe, J.A., 1989. "Quality air via natural ventilation." *OMAF-News*. Nov.-Dec. Pp. 9.

Choinière, Y. and Crabbe M., 1989. "Making naturally ventilated barns work." *Country Guide*. May. H-3. 4.

Weil, C., 1990. "Drainage taupe: un systme idéal pour drainer les sols lourds argileux." *Agricom*. Vol. 7. Mai. Pp. 7.

PROCEEDINGS

Choinière, Y., Munroe, J.A. and Blais, F., 1989. "Winter performance of different air inlets in a warm naturally ventilated swine barn." *Can. Agric. J.* Winter. Vol. 31. No. 1. Pp. 51-54.

Choinière, Y., Munroe, J.A., Desmarais, G., Dubois, H. and Renson, Y., 1989. "Effect of different ridge opening widths on the thermal performance and ventilation rate of a naturally ventilated swine building during warm summer conditions." *Can. Soc. Agric. Engng.* paper # 89-4065. 19 Pp.

Weil, C., Natho-Jina, S., Chambers, R. and Wires, K., 1989. "The feasibility of mole drainage in silicate clay soils subjected to freezing." *Can. Soc. Agric. Engng.* Paper # 89-2063, 21 Pp

BOOK, REPORTS, THESES

Chambers, R., Natho-Jina, S., Weil, C. and McKyes, E., 1990. *Improving the degraded structure of fine textured soils.* ACAFT Progress Report. March. 14 Pp.

Choinière, Y., 1989 *Natural ventilation of low rise buildings by the wind; Development of a model to predict average ventilation rates and the frequencies of consecutive hours below minimum limits of ventilation rate with summer meteorological data.* University of Ottawa and ACAFT Research Report. Alfred College. 48 Pp.

Choinière, Y. and Munroe, J.A., 1989. *Natural ventilation for livestock housing.* ACAFT Final Report. September. 178 Pp.

Choinière, Y., Munroe, J.A., Tremblay, A. and Tremblay, S., 1989. *Potential energy savings of natural ventilation versus mechanical ventilation for livestock housing in Ontario.* ACAFT Final Research Report for Ontario Hydro. December. 68 Pp.

Choinière, Y., Tremblay, A., Tremblay, S. and Munroe, J.A., 1990. *Guidelines for natural ventilation of swine housing in Ontario.* ACAFT Progress Report for OPPMB. March. 72 Pp.

Natho-Jina, S. and Weil, C., 1990. *Drainage taupe, un système idéal pour drainer les sols lourds argileux.* Technical Guide for farmers and contractors. March. 2 Pp.

Natho-Jina, S. and Weil, C., 1990. *Mole drainage, an ideal system for draining heavy clay soils.* Technical Guide for farmers and contractors. March. 2 Pp.

Natho-Jina, S., Weil, C. and Chambers, R., 1990. *Alfalfa yield performance with improved surface and subsurface drainage of fine textured soils.* ACAFT Progress Report. March. 19 Pp.

CENTRALIA COLLLEGE OF AGRICULTURAL TECHNOLOGY

PERIODICALS

Brolley, B., 1989. 46th Annual report of the *Ontario Vegetable Growers' Marketing Board.* "Effect of planting date and harvest date on sweet corn.", "Effect of planting date and harvest date on sweet corn.", "Supersweet sweet corn evaluation trial.", "Plant population trial." Pp. 12-14.

Brolley, B., 1989. Abstrs. in *Exp. Comm. Weeds Res.: East. Sect.* "Postemergent ragweed control in rutabagas." Pp. 358. "HOE 33171 and HOE 046360 with/without DPX A7881." Pp. 359. "Mustard control in rutabagas." Pp. 360. "Ragweed control in rutabagas using preplant incorporated and preemergent treatments." Pp. 361.

Brolley, B., 1989. *Pesticide Research Report.* "Early season flea beetle control using rutabaga seed treatments." Pp. 99. "Early season flea beetle control in rutabagas using topsprays." Pp. 100. "Powdery mildew control in rutabagas using seed treatments." Pp. 181.

Brolley, B., Lougheed, E.C., Shattuck, V.I. and Stobbs, L.W., 1989. "The effect of turnip mosiac virus infection on the mineral content and storability of field-grown rutabagas." *Commun. in Soil Sci. Plant Anal.* 20:581-595.

Currie, V.E., 1989. "The healthy fibre way — bean revisited." *The Emerging Bean — The O.B.P.M. Bd.* Fall. Pp.5.

Fleming, R.J., 1990. "The effect of manure spreading practices on water quality." *Hog Mkt. Pl. Quarterly.* Summer.

BOOKS, THESES, REPORTS

Forrest, R.E., 1990. *Centralia College Report to Ontario Oil and Protein Seed Crops Committee.* Guelph. January. 20 Pp.

Forrest, R.E., 1990. *Crop Research Methods — Continuing Education in Agronomy.* Centralia College. January. 11 Pp.

Forrest, R.E., 1990. 1989 *Eastern Canadian Co-operative Dry Bean Trial.* Centralia College. March. 34 Pp.

Forrest, R.E. and Heard, J. 1989. *Field Beans — Ontario Performance and Production.* Centralia College. March. 14 Pp.

Heard, J., Ablett, G.R., Michaels, T.E., O'Toole, J.J. and Forrest, R.E., 1990. *Production of Narrow-Row Direct Harvest White Beans in Ontario.* O.M.A.F. Factsheet. March. 4 Pp.

O'Toole, J.J. and Forrest, R.E., 1990. *Centralia College Report to Ontario Field Bean Committee.* London. February. 45 Pp.

ECONOMICS AND POLICY COORDINATION BRANCH

BOOKS, THESES, REPORTS

Burgess, B.D., 1989. *A survey of custom farmwork rates charged in Ontario, 1989. Economics and Policy Coordination Branch, OMAF Rpt. No. 89-14.* September. 19 Pp.

Fisher, J., 1989. *Economics of beef feedlot production, Ontario, 1987. Economics and Policy Coordination Branch, OMAF Rpt. No. 89-10.* August. 9 Pp.

Fisher, J., 1989. *Economics of cow-calf production, Ontario, 1987. Economics and Policy Coordination Branch, OMAF Rpt. No. 89-09.* August. 9 Pp.

Fisher, J., 1989. *Economics of sheep production, Ontario, 1987. Economics and Policy Coordination Branch, OMAF Rpt. No. 80-11.* August. 9 Pp.

Fisher, J., 1989. *Economics of swine production, Ontario, 1988. Economics and Policy Coordination Branch, OMAF Rpt. No. 89-12.* September. 11 Pp.

Fisher, J., 1990. *The economics of custom feedlot beef operations. RCAT's Beef Expo Proceedings.*

Fisher, J., 1990. *The economics of in-season versus out-of-season production of lamb. RCAT's Farmer's Week.*

Hope, D., 1989. *Building an enterprise livestock data base for extension and research use. Canadian Journal of Agricultural Economics.* 37(4): 591-595.

Hope, D., 1990. *The competitiveness of Ontario agriculture: the case for winter wheat, soybeans and corn. RCAT's Farmer's Week.*

Hope, D., 1990. *What can I pay for rented land? Western Ontario Farm.* Farm Management Supplement.

Hope, D., Campbell B. and Burgess, B., 1989. *Grain and forage crops: estimated production costs, Ontario, 1989. Economics and Policy Coordination Branch, OMAF Rpt. No. 89-05.* August. 25 Pp.

Hope, D., Campbell B., McKibbon, E.D. and Burgess B., 1989. *Vegetable crops: estimated production costs, Ontario, 1989. Economics and Policy Coordination Branch, OMAF Rpt. No. 89-06.* September. 59 Pp.

McKibbon, E.D., 1989. *Apple, peach and grape: estimated establishment costs, Ontario, 1989. Economics and Policy Coordination Branch, OMAF Rpt. No. 89-03.* August. 29 Pp.

McKibbon, E.D., 1989. *Fruit crops: estimated production costs, Ontario, 1989. Economics and Policy Coordination Branch, OMAF Rpt. No. 89-04.* July. 25 Pp.

Moxley, J., 1989. *Survey of pesticide use in Ontario, 1988. Economics and Policy Coordination Branch, OMAF Rpt. No. 89-08.* July. 40 Pp.

Tmej, L., 1989. *Consumer attitudes concerning direct farm sales outlets, Ontario, 1988. Economics and Policy Coordination Branch, OMAF Rpt. No. 89-07.* June. 22 Pp.

Statistical Services Unit. 1989. *Agricultural statistics for Ontario, 1988. Economics and Policy Coordination Branch,* Publication 20. August. 98 Pp.

Thompson, D., 1990. *The proposed federal goods and services tax and the agrifood sector. Economics and Policy Coordination Branch.* February. 12 Pp.

HORTICULTURAL RESEARCH INSTITUTE OF ONTARIO

PERIODICALS

Blom, T.J., 1989. "Quality water works." *Grnhse. Grower* 7(11): 48.

Blom, T.J., 1990. "Is sub-irrigation an alternative for container crops?" *The Grower* 40(1): 14.

Blom, T.J. and Piott, B.D., 1989. Abstrs. in *Hort. Res. in Canada.* Can. Hort. Council. "Comparison of subirrigation and low volume drip irrigation on pot chrysanthemums." Pp. 6. "The effect of fertility rate on pot chrysanthemums using subirrigation or a low volume drip system." Pp. 6.

Blom, T.J. and Piott, B.D., 1989. Abstrs. in *Hort. Res. Inst. of Ont. Rpt. for 1985.* "Greenhouse energy conservation." Pp. 72-74. "Greenhouse floricultural production management." Pp. 61-72.

Blom, T.J. and Piott, B.D., 1989. "First year report on a combined cultivar and supplemental lighting trial for Alstroemerias." *Grnhse. Can.* 9(7): 15, 19.

Blom, T.J. and Piott, B.D., 1989. "Water uptake and fertilizer distribution using different irrigation systems." *Grnhse. Can.* 9(6): 12, 35.

Blom, T.J. and Piott, B.D., 1990. "Constant soil temperature influences flowering of alstroemerias." *HortSci.* 25: 189-191.

Blom T.J., Brown, W. and Murphy, G., 1990. "Poinsettia gave growers headaches." *Grnhse. Can.* 10(3): 22-23.

Bonn, W.G. and Elfving, D.C., 1989. "Evaluation of flowering crabapples for resistance to fire blight caused by Erwinia amylovora." *Can. J. Plant Patbol.* 11:57-59.

Bonn, W.G. and Elfving, D.C., 1989. "Field performance of crabapples to fireblight." Abstr. in *Hort. Res. in Canada.* Can. Hort. Council. Pp. T4.

Brammall, R.A., 1989. Abstrs. in *Hort. Res. in Canada.* Can. Hort. Council. "Comparison of machine and hand glove cracking on the severity of green mold disease of garlic." Pp. V26. "The control of powdery mildew disease of muskmelons with foliar chemical and biotic treatments." Pp. V30. "Control of three leaf die back disease of super sweet corn." Pp. V19. "The effect of fungicidal drench treatments on the severity of *Fusarium* crown and root rot disease of tomato." Pp. V48. "The effect of soil type and chemical glove treatments on the severity of

green mold disease of garlic." Pp. V26. "The effect of soil type and chemical seed treatment on the severity of three leaf die back in corn." Pp. V19. "The effect of time of planting on the severity of green mold disease of garlic." Pp. V26. "The effect of transplant tray cell size on *Fusarium* in field processing tomatoes." Pp. V48. "Field soil persistence of the *Fusarium* crown and root rot pathogen of tomato." Pp. V48. "Screening melon varieties for resistance to an Ontario isolate of Fusarium Wilt." Pp. V30-V31. "Screening muskmelon cultivars for resistance to powdery mildew disease." Pp. V31. "Screening tomato cultivars and wild *Verticillium* wilt." Pp. V48.

Brammall, R.A., 1989. "A new race of *Verticillium dahliae* Kleb. of tomato in Ontario, Canada." *Can. J. Plant Pathol.* 11:186.

Brammall, R.A., 1989. "Benomyl-tolerance in isolates of Penicillium sp. causing green mold disease of garlic *(Allium sativum L.)*." *Can. J. Plant Pathol.* 11:186-187.

Brammall, R.A., 1989. "Resistance to benomyl in isolates of *Penicillium* sp. causing clove decay of garlic." *Can. J. Plant Pathol.* 11(4):409-414.

Brammall, R.A. and McKeown, A.W., 1989. "An occurrence in Ontario of Fusarium crown and root rot disease in field-grown processing tomatoes originating from multicelled tray transplants." *Can. J. Plant Pathol.* 11(1):75-77.

Cerkauskus, R.F. and McDonald, M.R., 1989. "Race 2 of *Fusarium oxysporum* f.sp. *appii* new to Ontario." *Plant Dis.* 73(10): 859.

Cerkauskas, R.F., Valk, M., Knibbe, E.N. and Burbidge, H., 1989. "Crop protection trials. E. Evaluation of parsnip cultivars for resistance to Phoma Canker at Bradford." Abstr. in *Hort. Res. Inst. of Ont. Rpt. for 1985.* Pp. 174-175.

Chiang, M.S., Chong, C., Chevier, G. and Crête, R., 1989. "Glucosinolates in clubroot-resistant and -susceptible selections of broccoli." *Hort.Sci* 24:665-666.

Chiang, M.S., Chong, C., Crête, R. and Fréchette, S., 1989. "Anther-culture-derived 2x-plants in cabbage *(Brassica oleracea* L. spp. *capitala* L.)." *Cytologia* 54:597-603.

Chong, C., 1989. "Container production at Greenleaf Nursery." *Hort. Rev.* 7(18):8-11.

Chong, C., 1989. "Protecting peach trees from roadside salt spray." Abstr. in *Hort. Res. in Canada.* Can. Hort. Council. Pp. T31.

Chong, C., 1989. "Revolutionary Oklahoma technique produces shade trees in two years." *Hort. Rev.* 7(19):8-10.

Chong, C., 1990. "Trickle irrigation: wave of the future." *Hort. Rev.* 8(1):26,29.

Chong, C. and Cline, R.A., 1989. "Growth of *Spiraea* in containers with varying proportions of papermill sludge." Abstr. in *Hort. Res. in Canada.* Can. Hort. Council. Pp. 14.

Chong, C. and Hamersma, B., 1989. Abstrs. in *Hort. Res. Inst. of Ont. Rpt. in 1985.* "Evaluation of ornamental plants." Pp. 57. "Influence of media and supplemental lighting on rooting of junipers." Pp. 58. "Rooting woody ornamentals with indolebutyric acid." Pp. 58-59. "Use of styrofoam in propagating rooting medium." Pp. 57-58.

Chong, C. and Hamersma, B., 1989. "Nursery research at Vineland: Five-year update." *Landscape Trades* 11(11):7-9.

Chong, C. and Smith, A., 1989. "Rhododendron breeding." Abstr. in *Hort. Res. Inst. of Ont. Rpt. for 1985.* Pp. 57.

Chong, C. and Wickware, M., 1989. "Mushroom compost trial at Canavonda Nursery." *Hort. Rev.* 7(6):10-11,13.

Chong, C., Hamersma, B. and Ponzo, D., 1989. "In search of the ultimate weed control disc." *Hort. Rev.* 7(17):8-11.

Chong, C., Lumis, G.P. and Cline, R.A., 1989. "Effects of fabric containers." *Am. Nurseryman* 170(11):51,53-55.

Chong, C., Lumis, G.P. and Cline, R.A., 1989. "In-ground fabric container alters tree growth and physiology." Abstr. in *Hort. Res. in Canada.* Can. Hort. Council. Pp. 14.

Chong, C., Lumis, G.P., Cline, R.A., Reissmann, H.J. and Hamersma, B., 1989. "Growth and chemical composition of poplar plants grown in Field-grow containers." Abstr. in *Hort. Res. Inst. of Ont. Rpt. for 1985.* Pp. 59.

Chu, C.L. and Jennings, D.R., 1989. Abstrs. in *Hort. Res. in Canada.* Can. Hort. Council. "Effect of controlled atmosphere storage temperature, and tree age on fruit quality of Empire apples." Pp. T22-T23. "Fruit quality studies of stored Empire and Delicious apples." Pp. T22.

Chu, C.L. and Wood, L.D., 1989. Abstrs. in *Hort. Res. Inst. of Ont. Rpt. for 1985* "Controlled Atmosphere (CA) storage of apples." Pp. 109. "Development of a starch-iodine test guide for maturity evaluation of Ontario apples." Pp. 108. "Low ethylene CA storage of apples." Pp. 109-110. "Low oxygen storage of apples." Pp. 109. "Rootstock effects on harvest maturity of apples." Pp. 108-109.

Chu, C.L., Cline, R.A. and Jennings, D.R., 1989. "Effect of controlled atmosphere storage on fruit quality of apples treated with field calcium spray." Abstr. in *Hort. Res. in Canada.* Pp. T22.

Chu, C.L., Elfving, D.C. Miller, P.L., Wood, L.D. and Pierce, W.F., 1989. Abstrs. in *Hort. Res. Inst. of Ont. Rpt. for 1985.* "Studies on Daminozide effects on apple maturity and storage life." Pp. 110. "Studies on Paclobutrazol effects on apple maturity and storage life." Pp. 110.

Chu, C.L., Jennings, D.R., Wood, L.D. and Miller, P.L., 1989. "Maturity indices of Red Delicious apples in Ontario." Abstr. in *Hort. Res. in Canada.* Can. Hort. Council. Pp. T23.

Chu, C.L., Miller, P.L. and Wood, L.D., 1989. "Development of an ethylene measurement technique to determine apple harvest maturity." Abstr. in *Hort. Res. Inst. of Ont. Rpt. for 1985.* Pp. 107-108.

Chu, C.L., O'Sullivan, J., Wood, L.D. and Bouw, W.J., 1989. "Studies on controlled atmosphere storage of green bell peppers." Abstr. in *Hort. Res. Inst. of Ont. Rpt. for 1985.* Pp. 111.

Chudyk, R.V. and Gadd, P.M., 1989. Abstrs. in *Hort. Res. Inst. of Ont. Rpt. for 1985.* "Effect of crop protection products on industrial microorganisms." Pp. 99-100. "Geographic analysis of grape quality in Ontario." Pp. 100. "Microbiological stability of horticultural food and beverage products." Pp. 100-101.

Chudyk, R.V., Edinger, W.D. and Gadd, P.M., 1989. "Development of a data base for wine grape standards." Abstr. in *Hort. Res. Inst. of Ont. Rpt. for 1985.* Pp. 99. .

Cline, R.A., 1989. "The Ontario leaf analysis service for fruit crops 1965-1985." *Hort. Res. Inst. of Ont. Rpt. for 1985.* Pp. 226-239.

Cline, R.A. and Ediger, B., 1989. Abstrs. in *Hort. Res. in Canada.* Can. Hort. Council. "The effect of lime on soil pH in sod orchards." Pp. T29. "The use of paper mill sludge in Ontario orchards and vineyards." Pp. T30.

Cline, R.A., Fisher, K.H., Reissmann, H.J., Norton, D. and Barkovic, J., 1989. "Fertilizer and soil management studies with grapes." Abstr. in *Hort. Res. Inst. of Ont. Rpt. for 1985.* Pp. 50-53.

Cline, R.A., Miles, N.W., Slingerland, K. and Ediger, B., 1989. "The effect of trickle irrigation and system of soil management on performance of four peach cultivars." Abstr. in *Hort. Res. in Canada.* Can. Hort. Council. Pp. T31.

Cline, R.A., Reissmann, H.J. and Norton, D., 1989. Abstrs. in *Hort. Res. Inst. of Ont. Rpt. for 1985.* "Fertilizer and soil management studies with stone fruit." Pp. 53-54. "Relationship of nutrition of growth nutrient uptake and fruit quality of apple trees grown on different rootstock." Pp. 47-50. "The use of papermill sludge on agricultural land." Pp. 55-56.

Cline, R.A., Reissmann, H.J., Fisher, K.H., Miles, N.W., Tehrani, G. and Norton, D., 1989. "Trickle irrigation studies with fruit crops." Abstr. in *Hort. Res. Inst. of Ont. Rpt. for 1985.* Pp. 56.

Cline, R.A., Rowe, S. and Hisan, L., 1989. "The relationship between sources of calcium and fruit calcium of Empire and MacIntosh apple." Abstr. in *Hort. Res. in Canada*. Can. Hort. Council. Pp. T12.

Coffin, R., Chase, R., Thompson, N., Johnston, G., McKeown, A., Keenan, M.K., Craven, D., Kitchen, R., Wilson, J. and Yada, R.Y., 1989. "Saginaw Gold: a yellow-fleshed potato cultivar with medium-high specific gravity and excellent chip and french fry quality after storage." *Am. Potato J.* 66:303-313.

Coffin, R., Johnston, G.R., McKeown, A., Yada, R.Y., Wilson, J., Keenan, M.K., Fitts, M., Langenburg, W., Garton, R. and Young, D., 1989. "Eramosa: a white-fleshed, first early tablestock potato cultivar." *Am. Potato J.* 66:293-302.

Courtney, W.H. and Banfield, G.E., 1989. Abstrs. in *Hort. Res. Inst. of Ont. Rpt. for 1985*. "Field tomato breeding." Pp. 154. "Greenhouse tomato breeding." Pp. 153. "Tomato genetics." Pp. 153-154.

Dale, A., 1989. Abstrs. in *Hort. Res. in Canada*. Can. Hort. Council. "Black currant management x cultivar trial." Pp. B26. "Management of day-neutral Strawberries." Pp. B22.

Dale, A., 1990. "What's new and juicy at Simcoe." *Ontario Berry Growers Assn. Newsletter* 2:2-8.

Dale, A. and Chong, C., 1989. Abstr. in *Hort. Res. in Canada*. Can. Hort. Council. "*Fragaria virginiana* for ground cover." Pp. I6.

Dale, A. and Reynolds, L., 1989. "Strawberry cultivar trials." Abstr. in *Hort. Res. in Canada*. Can. Hort. Council. Pp. B26.

Dale, A. and Vandenberg, A.A., 1989. Abstrs. in *Hort. Res. in Canada*. Can. Hort. Council. "Promising advanced strawberry selection." Pp. B17. "Strawberry cultivar trials." Pp. B25. "Tolerance of wild strawberry isolates from Ontario to root-lesion nematode." Pp. B20.

Dale, A. and Vandenberg, A.A., 1989. "Ontario strawberry and raspberry plant propagation program." Abstr. in *Hort. Res. Inst. of Ont. Rpt for 1985*. Pp. 138-139.

Dale, A., Evans, W.D., Chandler, C. and Vandenberg, A.A., 1989. "Strawberry breeding." Abstr. in *Hort. Res. Inst. of Ont. Rpt. for 1985*. Pp. 135.

Dale, A., Gray, V.P. and Ricketson, C.L., 1989. "Governor Simcoe strawberry." *Hort. Res. Inst. of Ont. Rpt. for 1985*. Pp. 199.

Dale, A., Vandenberg, A.A. and Chandler, C., 1989. Abstrs. in *Hort. Res. Inst. of Ont. Rpt. for 1985*. "Management of small fruits." Pp. 135-137. "Processing strawberry research and development." Pp. 137.

Daubery, H.A., Sjulin, T. and Dale, A., 1989. "Algonquin raspberry (tested and originally released as BC 72-1-7)." Abstr. in *Hort. Res. in Canada*. Can. Hort. Council. Pp. N2.

Edgington, L.V., Hamilton, J.R. and Burbidge, H., 1989. "Crop protection trials. D. Fungicidal control of Botrytis blight in onions." Abstr. in *Hort. Res. Inst. of Ont. Rpt. for 1985*. Pp.174.

Edgington, L.V., Hamilton J.R. and Knibbe, E.N., 1989. "Crop protection trials. A. Use of surfactants to control clubroot (Plasmodiophora brassicae) in cauliflower." Abstr. in *Hort. Res. Inst. of Ont. Rpt. for 1985*. Pp. 171-172.

Edinger, W.D. and Holman, L.L., 1989. Abstrs. in *Hort. Res. Inst. of Ont. Rpt. for 1985*. "Carbonic maceration of grapes for wine production." Pp. 87-88. "Development of improved wine quality control methods." Pp. 89-90. "Evaluation of new grape varieties for wine production." Pp. 90. "Modification of white wine production." Pp. 86-87. "Occurrence and control of microbial metabolites in wine." Pp. 91. "Use of enzymes in wine production and analysis." Pp. 88-89.

Elfving, D.C., 1989. "Effects of soil-applied paclobutrazol (PBZ) and pruning severity on growth and flowering of four crabapple pollenizers." Abstr. in *Hort. Res. in Canada*. Can. Hort. Council. Pp. T18.

Elfving, D.C., 1989. "The origin of the 'Empire' apple." *The Grower* 39(12):6.

Elfving, D.C. and Cline, R.A., 1990. "Growth and productivity of vigorous 'Northern Spy'/MM.106 apple trees in response to annually applied growth control techniques." *J. Amer. Soc. Hort. Sci.* 115:212-18.

Elfving, D.C. and Lougheed, E.C., 1989. "Chemical thinning of apple with 6-benzyladenine in 1988." *Hort Sci.* 24:113.

Elfving, D.C., and Pierce, W.F., 1989. Abstrs. in *Hort. Res. in Canada*. Can. Hort. Council. "Effect of pruning on growth and cropping of six apple cultivars." Pp. T15-T16. "Effects of canopy training system on growth and productivity of two apple cultivars on Mark rootstock." Pp. T17. "Effects of Naphthaleneacetic acid (NAA), Ethephon (EH) on crop load and fruit size of Delicious apple." Pp. T16. "Effects of 6-Benzyladenine (BA) concentration and timing on fruit set and yield of Macintosh apple." Pp. T17. "Effects of trickle irrigation on Idared apple trees on M.26 and MM.106 rootstocks." Pp. T19. "Effects of various size-controlling rootstocks on performance of Starkspur Supreme Delicious." Pp. T22. "Effects of various size-controlling rootstocks planted in 1980 on performance of Starkspur Supreme Delicious." Pp. T21.

Elfving, D.C. and Pierce, W.F., 1989. Abstrs in *Hort. Res. Inst. of Ont. Rpt. for 1985*. "Control of growth and fruitfulness in apples with Daminozide (Alar), Ethephon (Ethrel) and Cultar (Paclobutrazol)." Pp. 122-124. "Effects of gibberellic acid (GA) on apple trees." Pp. 121-122 "Evaluation of apple rootstocks for suitability under southwestern Ontario conditions." Pp. 130-133. "Pruning and Daminozide (Alar) treatments for apple-tree growth control." Pp. 126-127. "Trickle irrigation of apple trees." Pp. 129.

Elfving, D.C., Bonn, W.G. and Pierce, W.F., 1989. "Evaluation of apple cultivars. A. Evaluation of candidate crabapple cultivars for fireblight resistance." Abstr. in *Hort. Res. Inst. of Ont. Rpt. for 1985*. Pp. 133-134.

Elfving, D.C., Chu, C.L. and Pierce, W.F., 1989. "Control of growth and fruitfulness in apples with Daminozide (Alar), Ethephon (Ethrel) and Cultar (Paclobutrazol). F. Effects of foliar sprays of Cultar (Paclobutrazol) on shoot growth and fruit quality of young McIntosh apple trees." Abstr. in *Hort. Res. Inst. of Ont. Rpt. for 1985*. Pp. 124-125.

Elfving, D.C., Chu, C.L., Hisaw, L. and Pierce, W.F., 1989. "Effects of Daminozide (Alar) and Ethephon (Ethrel) applications on fruit quality in apples." Abstr. in *Hort. Res. Inst. of Ont. Rpt. for 1985*. Pp. 125-126.

Elfving, D.C., Chu, C.L., Lougheed, E.C. and Pierce, W.F., 1989. Abstr. in *Hort. Res. Inst. of Ont. Rpt. for 1985*. "Control of growth and fruitfulness in apples with Daminozide (Alar), Ethephon (Ethrel) and Cultar (Paclobutrazol) C. Effects of soil-applied cultar (Paclobutrazol) on growth, productivity and fruit characteristics of McIntosh apple trees." Pp. 123-124.

Elfving, D.C., Chu, C.L., Lougheed, E.C., Proctor, J.T.A., Pierce, W.F. and Louttit, D., 1989. "Control of growth and fruitfulness in apples with Daminozide (Alar), Ethephon (Ethrel) and Cultar (Paclobutrazol). B. Effects of foliar — and soil — applied Cultar (Paclobutrazol) on growth and fruit quality of Spartan apple trees." Abstr. in *Hort. Res. Inst. of Ont. Rpt. for 1985*. Pp. 123.

Elfving, D.C., Cline, R.A. and Pierce, W.F., 1989. Abstrs. in *Hort. Res. in Canada*. Can. Hort. Council. "Effect of palmette-leader vs. central-leader of canopy management on production and fruit quality of vigorous Macintosh apple trees." Pp. T17-T18. "Effects of Alar and Ethrel applications and root pruning on growth and productivity of Northern Spy apple trees." Pp. T19. "Effects of Nitrogen (N) and chemical thinning on growth and productivity of Spur Delicious apple trees." Pp. T16.

Elfving, D.C., Cline, R.A., Pierce, W.F. and Reissmann, J., 1989. Abstrs. in *Hort. Res. Inst. of Ont. Rpt. for 1985*. "Nitrogen effects on growth and fruiting." 128. "Trickle irrigation of fruit

trees. B. Effects of trickle irrigation and differential nitrogen fertilization on growth of young apple trees on M.26 and MM.106 rootstocks." Pp. 129-130.

Elfving, D.C., Lougheed, E.C., and Pierce, W.F., 1989. "Effects of 6-Benzyladenine (BA) and Carbaryl (Sevin) timing on yield and fruit storage behaviour of Idared apple." Abstr. in *Hort. Res. in Canada*. Can. Hort. Council. Pp. T17.

Elfving, D.C., Lougheed, E.C. and Pierce, W.F., 1989. "Control of growth and fruitfulness in apples with Daminozide (Alar), Ethephon (Ethrel) and Cultar (Paclobutrazol). D. Effects of trunk-injected Cultar (Paclobutrazol) on growth and productivity of Northern Spy/M.26 apple trees." Abstr. in *Hort. Res. Inst. of Ont. Rpt. for 1985*. Pp. 124.

Elfving, D.C., Lougheed, E.C., Chu, C.L. and Cline, R.A., 1989. "Daminozide (DZ), paclobutrazol (PBZ) and uniconazol (UCZ) effects on 'McIntosh' fruit at harvest and following air storage." *Plant Growth Regulator Soc. Amer.* Quart. 17(3):82.

Elfving, D.C., Lougheed, E.C., Chu, C.L. and Cline, R.A., 1989. "Daminozide, paclobutrazol and uniconazol effects on 'McIntosh' apples at harvest and following air storage." *Proc. Plant Growth Regulator Soc. Amer. Quart.* 16:40-41.

Elfving, D.C., Lougheed, E.C., Cline, R.A. and Pierce, W.F., 1989. Abstrs. in *Hort. Res. in Canada*. Can. Hort. Council. "Effects of Alar and Paclobutrazol (PBZ) applications in 1987 on Macintosh fruit drop and fruit quality." Pp. T18. "Effects of Alar, Paclobutrazol (PBZ) and Uniconazol (XE-1019) on Macintosh fruit drop and fruit quality." Pp. T18. "Effects of root pruning (RP) or trunk scoring (SC) at different times during the growing season." Pp. T19.

Elfving, D.C., Miles, N., Chu, C.L. and Slingerland, K., 1989. "Evaluation of Granny Smith apple production and quality in a protected environment structure." Abstr. in *Hort. Res. in Canada*. Can. Hort. Council. Pp. T19.

Elfving, D.C., Proctor, J.T.A., Pierce, W.F. and Louttit, D., 1989. "Fruit growth studies." Abstr. in *Hort. Res. Inst. of Ont. Rpt. for 1985*. Pp. 128-129.

Elfving, D.C., Thistlewood, H.M.A., and Pierce, W.F., 1989. Abstrs. in *Hort. Res. in Canada*. Can. Hort. Council. "Effects on Naphthaleneacetic Acid (NAA) and Corbaryl (Sevin) on Delicious apples." Pp. T16. "Effects of 6-Benzyladenine (BA) and Carbaryl (Sevin) on fruit-seh, yield and fruit quality of Idared apple." Pp. T16.

Fisher, K.H., 1989. "Vinifera growers survey." Abstr. in *Hort. Res. in Canada*. Can. Hort. Council. Pp. 138-139.

Fisher, K.H., 1989. "Grape breeding at Vineland." *The Grower.* 39(6):18.

Fisher, K.H. and Barkovic, J., 1989. Abstrs. in *Hort. Res. in Canada*. Can. Hort. Council. "Rapid propagation of Sovereign Coronation grapevines." Pp. B9. "Top wire cordon training and vineyard mechanization." Pp. B8.

Fisher, K.H. and Barkovic, J., 1989. Abstrs. in *Hort. Res. Inst. of Ont. Rpt. for 1985*. "Apricot breeding and cultivar evaluation." Pp. 11. "Grapevine rootstock studies." Pp. 23-28.

Fisher, K.H. and Bradt, O.A., 1989. *Hort. Res. Inst.of Ont. Rpt. for 1985*. Pp. 194-198. "Vanessa grape.", "Vivant grape."

Fuleki, T., 1989. Abstrs. in *Hort. Res. Inst. of Ont. Rpt. for 1985*. "Anthocyanin pigment composition of horticultural crops grown in Ontario. B. Determining the varietal content of red grape juice concentrate on the basis of anthocyanin pigment patterns." Pp. 96-97. "Recovery of useful constituents from grape pomace and other fruit and vegetable processing plant waste material." Pp. 91.

Fuleki, T., 1989. "New uses and markets for Vincent grapes." *The Grower.* 39(10):11.

Fuleki, T. and Cameron, R.K., 1989. "Color quality problems in horticultural crops and their products. A. Effects of a commercial anthocyanase enzyme preparation on grape juice and wine." Abstr. in *Hort. Res. Inst. of Ont. Rpt. for 1985*. Pp. 95.

Fuleki, T. and Dietch, P.K., 1989. "Color quality problems in horticultural crops and their products. A. Discoloration of frozen cauli-flower." Abstr. in *Hort. Res. Inst. of Ont. Rpt. for 1985*. Pp. 118-119.

Fuleki, T. and Palaby, R.B., 1989. Abstrs. in *Hort. Res. in Canada*. Can. Hort. Council. "Changes in the composition of Vincent grapes during maturation." Pp. 86. "An HPLC method for the quantitative analysis of sugars and sorbitol in fruits." Pp. 86. "Juice potential of freestone peaches." Pp. T30.

Fuleki, T. and Palabay, R.B., 1989. Abstrs. in *Hort. Res. Inst. of Ont. Rpt. for 1985*. "Analyses of chemical and physical indexes of quality in wine, juice and table grape cultivars and selections." Pp. 93-94. "A. Objective evaluation of flavor characteristics of grape breeding material. B. Physical composition of table grape cultivars and selections." Pp. 93-94. "Anthocyanin pigment composition of horticultural crops grown in Ontario. C. Pre-harvest pigment analyses of grapes." Pp. 97. "Development of methods for measuring the external and internal color of fruits, vegetables and their products." Pp. 117. "Juice making potential of mechanically harvested strawberries." Pp. 118. "Juice potential of commercial grape cultivars." Pp. 92.

Fuleki, T. and Pelayo, E., 1989. "A quantitative method using HPLC for organic acids in fresh and processed fruits." Abstr. in *Hort. Res. in Canada*. Can. Hort. Council. Pp. T13.

Fuleki, T. and Pelayo, E., 1989. "Development of a quantitative method using HPLC for the determination of organic acids in grape juice." Abstr. in *Rpt. of Ont. Grape and Wine Res. Comm.* Pp. 20.

Fuleki, T. and Sommerville, R.G., 1989. "Anthocyanin composition of horticultural crops grown in Ontario. A. Development of an HPLC method for the separation of grape anthocyanins." Abstr. in *Hort. Res. Inst. of Ont. Rpt. for 1985*. Pp. 95-96.

Fuleki, T., Dick, P.T. and Hubberstey, A.V., 1989. "Juice potential of commercial grape cultivars. C. Quality of commercial grape juice concentrate." Abstr. in *Hort. Res. Inst. of Ont. Rpt. for 1985*. Pp. 92-93.

Fuleki, T., Lindsay, E. and Duggan, M., 1989. "Development of HPLC based analytical methods for quality control in the food and beverage industry. A. Development of a quantitative method for the analysis of organic acids in grape, wine and juice using HPLC." Abstr. in *Hort. Res. Inst of Ont. Rpt. for 1985*. Pp. 98-99.

Fuleki, T., Palabay, R.B. and Pelayo, E., 1989. Abstrs. in *Rpt. of Ont. Grape and Wine Res. Comm.* "Analysis of chemical and physical indices of quality in wine, juice and table grape cultivars and selections using high pressure liquid chromatography." Pp. 22. "Chemical fingerprinting of fruits." Pp. 21. "Investigation of new techniques and cultivars in the development of potentially useful products from fruits and vegetables: Juice potential of commercial grape cultivars." Pp. 21.

Fuleki, T., Pelayo, E. and Palabay, R.B., 1989. "Individual sugar and acid composition of juice produced from different grape cultivars." Abstr. in *Rpt. of Ont. Grape and Wine Res. Comm.* Pp. 21.

Giesbrecht, R.J., Fuleki, T. and Duitschaever, C.L., 1989. "Ultrafiltration and reverse osmosis in beverage technology." Abstr. in *Hort. Res. Inst. of Ont. Rpt. for 1985*. Pp. 98.

Hamersma, B. and Chong, C., 1989. "Plant of the month: *Ginkgo biloba*." *Landscape Trades* 11(6):60-61.

Ingratta, F.J., Straver, W.A. and Sonzogni, C., 1989. "Greenhouse vegetables." Abstr. in *Hort. Res. Inst. of Ont. Rpt. for 1985*. Pp. 75-78.

Lauro, E.M., 1989. "Extending the harvest: Fruit and vegetable storage technology." *Highlights of Agric. Res.* Ont. 12(2):25-28.

Lauro, E.M., Chu, C.L. and Smith, R.B., 1989. "Storage facility operation and management — Engineering aspects." Abstr. in *Hort. Res. Inst. of Ont. Rpt. for 1985.* Pp. 111.

Lauro, E.M., Chu, C.L. and Smith, R.B., 1989. "New storage research facilities for horticultural crops." *Hort. Res. Inst. of Ont. Rpt. for 1985.* Pp. 216-225.

Lauro, E.M., Chu, C.L. and Wismer, J.D., 1989. "Development of storage monitoring technology." Abstr. in *Hort. Res. Inst. of Ont. Rpt. for 1985.* Pp. 111-112.

Lauro, E.M., Clarke, K.A. and Smith, R.B., 1989. "Energy aspects of storage." Abstr. in *Hort. Res. Inst. of Ont. Rpt. for 1985.* Pp. 112.

Lauro, E.M., Fuleki, T. and Palabay, R., 1989. "Engineering aspects of food and beverage processing." Abstr. in *Hort. Res. Inst. of Ont. Rpt. for 1985.* Pp. 101.

Lauro, E.M., Wismer, J.D. and Smith, R.B., 1989. "Dehumidification equipment for refrigerated storage." Abstr. in *Hort. Res. in Canada.* Can. Hort. Council. Pp. V35.

Leozkowiat, M.J., Yada, R.Y., Coffin, R.H., Stanley, D.W. and McKeown, A.W., 1989. "Chip colour, sugar content and yield of summer potatoes during growth in southern Ontario." *Can. J. of Plant Sci.* 69:341-346.

Loughton, A., 1989. "Alternative horticultural crops to tobacco in southern Ontario." *Hort. Res. Inst. of Ont. Rpt. for 1985.* Pp. 204-215.

Loughton, A. and Baker, R., 1989. Abstrs. in *Hort. Res. Inst. of Ont. Rpt. for 1985.* "Alternative crops for tobacco farms." Pp. 142-144. "Asparagus production and management." Pp. 139-141. "Cole crop production and management." Pp. 144-152. "Garlic production." Pp. 142.

Loughton, A., Baker, R. and Cerkauskas, R., 1989. Abstrs. in *Hort. Res. Inst. of Ont. Rpt. for 1985.* "Cole crop production and management. D. Incidence and control of surface head rot in broccoli." Pp. 151-152.

Loughton, A., Baker, R. and Riekels, J.W., 1989. "Cole crop production and management. C. Nutritional aspects of black speck in cauliflower curds." Abstr. in *Hort. Res. Inst. of Ont. Rpt. for 1985.* Pp. 150-151.

McDonald, M.R. and Burbidge, H., 1989. "Onion cultivar storage trial — 1988-89." Abstr. in *Hort. Res. in Canada.* Pp. V35.

McDonald, M.R. and Chapuh, J.R., 1989. "Evaluation of Phero-Tech., Non-UV white traps for the monitoring of the onion maggot." Abstr. in *Hort. Res. in Canada.* Can. Hort. Council. Pp. V33.

McDonald, M.R. and Edgington, L.V., 1989. "Evaluation of metalyaxyl and plant growth — promoting rhizobacteria for the control of cavity spot of carrot." *Can. J. Plant Patbol.* 11:194.

McDonald, M.R., Burbidge, H. and Smith, B., 1989. "Agral 90 for clubroot control on cabbage." Abstr. in *Hort. Res. in Canada.* Can. Hort. Council. Pp. V10.

McDonald, M.R., Burbidge, H. and Smith, B., 1989. "Evaluation of the surfactant, Agral 90, for the control of clubroot of cabbage." Abstr. in *Exp. Comm. on Pest. Use in Agri. Pest. Res. Rpt.* Pp. 167.

McDonald, M.R., Edgington, L.V. and Ripley, B., 1989. Abstrs. in *Exp. Comm. on Pest. Use in Agric. Pest. Res. Rpt.* "Evaluation of fungicide seed dressings for the control of cavity spot of carrot 1987." Pp. 175. "Evaluation of metalaxyl rates and the time of application for the control of cavity spot of carrot — 1987." Pp. 176.

McKeown, A.W., 1989. "Yield response of early potatoes to chitting." *Am. Potato J.* Pp. 532.

McKeown, A., 1989. Abstrs. in *Hort. Res. in Canada.* Can. Hort. Council. "Comparison of slow chitting at cool temperatures to quick chitting at warm temperatures." Pp. P20. "Cover crops following first early potatoes." Pp. P20. "Effect of date of seed cutting on emergence and yield of potatoes." Pp. P13. "Emergence and early yield of five cultivars of potatoes after chitting." Pp. P13. "Emergence and yield of seed portions of Monona potatoes treated with fungicides." Pp. P13-P14.

McKeown, A.W., 1990. *Simcoe Reformer.* "Early potatoes aim for July 1." Feb. 26. Pp. 8, 24. "Storage and handling of potatoes in relation to physiological age." Feb. 26. Pp. 17.

McKeown, A.W., 1990. "Potato management profiles: future developments." *The Grower.* 40(3):22.

McKeown, A.W. and Reynolds, L.A., 1989. Abstrs. in *Hort. Res. Inst. of Ont. Rpt. for 1985.* "Fresh market tomato cultivar trials in 1985." Pp. 156. "Production practices for potatoes for early or main crop." Pp. 158-161. "Seed potato production and physiology." Pp. 156-158.

McKeown, A.W., Cerkauska, R. and Potter, J., 1989. "Long-term evaluation of strip tillage into fall-sown cover crops." Abstr. in *Hort. Res. in Canada.* Can. Hort. Council. Pp. V59-V60.

McKeown, A.W., Reynolds, L.A. and Coffin, R., 1989. Abstrs. in *Hort. Res. Inst. of Ont. Rpt. for 1985.* "Production practices for potatoes for early or main crop. A. Evaluation of cultivars for their adaptability for early July markets." Pp. 158-159. "B. Evaluation of cultivars for main crop markets." Pp. 159. "C. Evaluation of advanced breeding lines in 10-hill plots." Pp. 159-160.

McKeown, A.W., Reynolds, L.A. and Craven, D., 1989. "Production practices for potatoes for early or main crop. E. Evaluation of tolerance of Shepody to metribuzin." Abstr. in *Hort. Res. Inst. of Ont. Rpt. for 1985.* Pp. 160-161.

McKeown, A.W., Reynolds, L.A. and Wang, S., 1989. "Production practices for machine harvested tomatoes. B. Yields and solids response of H2653 tomatoes to amount and timing of nitrogen." Abstr. in *Hort. Res. Inst. of Ont. Rpt. for 1985.* Pp. 155-156.

McKeown, A.W., Reynolds, L.A., Cerkauskas, R.F. and Potter, J.W., 1989. "Production practices for machine harvested tomatoes. A. Evaluation of strip-tillage into fall sown cover crops as a production system for tomatoes." Abstr. in *Hort. Res. Inst. of Ont. Rpt. for 1985.* Pp. 154-155.

McKeown, A.W., Wang, S.L., Reynolds, L.A. and Rodrick, I.L., 1989. "Processing quality studies on tomatoes. B. Tomato solids in response to nitrogen fertilization." Abstr. in *Hort. Res. Inst. of Ont. Rpt. for 1985.* Pp. 113-114.

Miles, N.W., 1990. *Niagara Update* "Early maturing Vineland peach selections available." 90(3):7. "Further expansion of the clingstone peach industry possible." 90(2):5. "The early peach dilemma: Can 'Harrow Diamond' make the grade?" 90(3):5-6.

Miles, N.W. and Biggs, A.R., 1989. Abstrs. in *Hort. Res. in Canada.* Can. Hort. Council. "Breeding for field resistance of peaches to canker disease." Pp. T28. "Control of cytospora canker disease in peach." Pp. T28.

Miles, N.W. and Biggs, A.R., 1989. "Cytospora canker disease of peach: Breeding for resistance." *Highlights Agric. Res. in Ont.* 12(2):11-14.

Miles, N.W. and Cline, R.A., 1989. "Trellised peach orchard studies." Abstr. in *Hort. Res. in Canada.* Can. Hort. Council. Pp. T31.

Miles, N.W. and Wang, S., 1989. "Breeding clingstone peaches." Abstr. in *Hort. Res. in Canada.* Can. Hort. Council. Pp. T28.

Miles, N.W., Cline, R.A. and Slingerland, K., 1989. "Protected fruit culture." Abstr. in *Hort. Res. Inst. of Ont. Rpt. for 1985.* Pp. 45-46.

Miles, N.W., Elfving, D.C. and Slingerland, K., 1989. "Evaluation of apple cultivars. B. Evaluation of Granny Smith apple production and quality in a protected environmentstructure." Abstr. in *Hort. Res. Inst. of Ont. Rpt. for 1985.* Pp. 134-135.

O'Sullivan, J., 1990. "There's a market for local melons." *Simcoe Reformer.* Feb. 26. Pp. 5.

O'Sullivan, J. and Bouw, W.J., 1989. Abstrs. in *Exp. Comm. on Weeds, Res. Rpt.: East. Sect.* "Effect of herbicides on nightshade control." Pp. 554. "Weed control in cucumbers." Pp. 429. "Weed control in established asparagus." Pp. 396. "Weed control in garlic." Pp. 404. "Weed control in green peas." Pp. 424. "Weed control in potatoes I." Pp. 445. "Weed control in potatoes II." Pp. 446. "Weed control in snap beans." Pp. 344. "Weed control in sweet corn I." Pp. 166. "Weed control in transplanted broccoli." Pp. 401. "Weed control in transplanted onions." Pp. 414. "Weed control in transplanted peppers." Pp. 434. "Weed control in transplanted tomato." Pp. 393.

O'Sullivan, J. and Bouw, W.J., 1989. Abstrs. in *Hort. Res. in Canada*. Can. Hort. Council. "Effect of date of seeding on yield of cucumbers." Pp. V22. "Effect of row spacing on cucumber yield." Pp. V22. "Evaluation of processing cucumber cultivars." Pp. V25. "Evaluation of processing cucumber cultivars for once-over machine harvesting." Pp. V24. "Muskmelon cultivar evaluation." Pp. V32. "Pepper cultivation evaluation." Pp. V43. "Response of muskmelons to plastic mulch." Pp. V31-V32. "Response of peppers to plastic mulch." Pp. V40. "Watermelon cultivar evaluation." Pp. V32.

O'Sullivan, J. and Bouw, W.J., 1989. Abstrs. in *Hort. Res. Inst. of Ont. Rpt. for 1985*. "The development of herbicide programs for weed control in various horticultural crops." Pp. 164-166. "Influence of cultivar and other factors of production on yield and quality of peppers." Pp. 161-162. "Muskmelon cultivar evaluation." Pp. 164. "Production practices for pickling cucumbers grown for mechanical and hand harvesting." Pp. 162-164.

Piedrahita, O. and Chong, C., 1989. "Prevention of salt-spray injury to trees." Abstr. in *Hort. Res. Inst. of Ont. Rpt. for 1985*. Pp. 59-60.

Potter, J.W., Dale, A. and Wainman, L.I., 1989. "Tolerance of wild strawberry isolates form Ontario to root-lesion nematode." Abstr. in *Hort. Res. in Canada*. Can. Hort. Council. Pp. B20.

Prive, J.P., Elfving, D.C. and Proctor, J.T.A., 1989. "Paclobutrazol, gibberellin and cytokinin effects on growth, development and histology of apple pedicels and fruits." *J. Amer. Soc. Hort. Sci.* 114:273-278.

Prive, J.P., Elfving, D.C. and Proctor, J.T.A., 1988. "Pedicel characteristics of four apple cultivars." *Fruit Var. J.* 42(4):122-125.

Reynolds, L.B., McKeown, A.W. and Rosa, N., 1989. "Sweet potato production trials." Abstr. in *Hort. Res. in Canada*. Can. Hort. Council. Pp. V68-V69.

Reynolds, L.B., Rosa, N. and McKeown, A., 1990. "Production of sweet potatoes in Ontario." *Simcoe Reformer* Feb. 28. Pp. 19, 22.

Rinker, D.L., 1989. "Fungi potpourri." *Highlights of Agric. Res.* in Ont. 12(1):12-15.

Rinker, D.L., 1989. *Mushroom Notes* Vol. 9, (Issues 1-3), HES/HRIO Vineland.

Rinker, D.L., Alm, G. and Mancini, L., 1989. Abstrs. in *Hort. Res. Inst. of Ont. Rpt. for 1985*. "Casing soil studies." Pp. 79. "Pesticide evaluation." Pp. 81-83. "Yield response to supplementation." Pp. 80-81.

Rinker, D.L. and Alm, G., 1989. Abstrs. in *Hort. Res. in Canada*. Can. Hort. Council. "Utilization of flax shive in Agaricus mushroom production." Pp. V33. "Utilization of flax shive in Pleurotus mushroom production." Pp. V33.

Rinker, D.L., Anderson, J. and Alm, G., 1989. "Strain development trials." Abstr. in *Hort. Res. Canada*. Can. Hort. Council. Pp. V33.

Rosa, N., Reynolds, L.B. and McKeown, A.W., 1989. "Sweet potato composition of selected chemicals." Abstr. in *Hort. Res. in Canada. Can. Hort. Council.* Pp. V67.

Ross, G.J., Cline, R.A. and Gamble, D.S., 1989. "Potassium exchange and fixation in some southern Ontario soils." *Can. J. Soil Sci.* 69:649-661.

Schumaker, B.R. and Baker, R., 1989. Abstrs. in *Hort. Res. in Canada*. Can. Hort. Council. "Asparagus cultivar evaluation." Pp. V4. "Broccoli cultivar evaluation." Pp. V9. "Effects of planting depth x row widths on asparagus productions." Pp. V3. "Garlic date of planting evaluation." Pp. V27. "Garlic (strains) cultivar evaluation." Pp. V26. "Jumbo onion cultivar" evaluation." Pp. V36. "Lettuce cultivar evaluation." Pp. V30. "Radicchio cultivar evaluation." Pp. V70.

Smith, A.W., 1989. *Hort. Res. Inst. of Ont. Rpt. for 1985*. Pp. 200-203. "Vinebelle rhododendron.", "Vinecrest rhododendron.", "Vinedale rhododendron.", "Vinemount rhododendron.", "Vinerouge rhododendron."

Smith, R.B. and Skog, L.J., 1989. Abstrs. in *Hort. Res. Inst. of Ont. Rpt. for 1985*. "Asparagus storage studies." Pp. 105-106. "Celery storage studies." Pp. 106. "Dessert grape storage studies." Pp. 103-104. "Improvement of cranberry growing in Ontario." Pp. 107. "Predicting commercial harvest dates of selected Ontario peach cultivars." Pp. 101-103. "Storage studies on peaches for processing." Pp. 103. "Storage studies on processing strawberries." Pp. 104. "Studies on cauliflower controlled atmosphere storage." Pp. 106.

Smith, R.B., Cobbledick, R.H. and Skog, L.J., 1989. "Storage studies on fresh strawberries." Abstr. in *Hort. Res. Inst. of Ont. Rpt. for 1985*. Pp. 105.

Smith, R.B., Schumacher, B.R., Skog, L.J. and Baker, R., 1989. "Spanish onion storage cultivar trials." Abstr. in *Hort. Res. in Canada*. Can. Hort. Council. Pp. V35.

Smith, R.B., Skog, L.J. and Burbidge, H.N., 1989. Abstrs. in *Hort. Res. in Canada*. Can. Hort. Council. "Effect of celery maturity on post-harvest quality." Pp. V18. "Effect of cultivar on the post-storage quality of celery." Pp. V18.

Smith, R.B., Skog, L.J. and Uyenake, J., 1989. Abstrs. in *Hort. Res. in Canada*. Can. Hort. Council. "Cabbage cultivar storage trials." Pp. V12. "Storage trials with sand grown celery." Pp. V18.

Straver, W.A., 1990. "Growing vegetables on rockwool has many advantages". *Grnbse* Can. 10(3):11-15.

Straver, W.A., 1989. "Improving quality of greenhouse cucumbers". *The Grower* 39(4):25, 29.

Straver, W.A. and Fluit, R.G., 1989. Abstrs. in *Hort. Res. in Canada*. Can. Hort. Council. "Cucumbers: Seedless cucumber trials." Pp. V24. "Double stem training systems for seedless greenhouse cucumbers." Pp. V23. "The effect of nutrient concentrations and planting dates on rockwool grown tomatoes." Pp. V61. "The effect of nutrient solution conductivity on seedless cucumbers." Pp. V23. "Evaluation of inert substrates for cucumbers — Fall 1988." Pp. V23. "Growing system for greenhouse tomatoes." Pp. V61. "Inert substrates for seedless greenhouse cucumbers." Pp. V23. "Substrates for greenhouse tomatoes." Pp. V61. "Greenhouse tomato cultivar trial." Pp. V65.

Svircev, A.M., Biggs, A.R., Miles, N.M. and Chong, C., 1989. "Regeneration of peach plants from tissue culture and the isolation of a toxin from peach canker fungus." Abstr. in *Hort. Res. in Canada*. Can. Hort. Council. Pp. T29.

Tehrani, G. and Dickson, G.H., 1989. "Viscount sweet cherry." *Hort. Res. Inst. of Ont. Rpt. for 1985*. Pp. 192-193.

Tehrani, G. and Lay, J.W., 1989. Abstrs. in *Hort. Res. in Canada*. Can. Hort. Council. "Breeding European plums for fresh market." Pp. T34. "Distribution of budwood from superior stock programs." Pp. T36. "Effect of different seedling and colonal rootstocks on growth of Montmorency tart cherry cultivar." Pp. T27. "Effect of different seedling and clonal rootstocks on growth of Hedelfingen sweet cherry cultivar." Pp. T27. "Influence of rootstock on productivity and growth of European plum." Pp. T35. "Influence of rootstock on productivity and vigor of Japanese plum cultivars." Pp. T35. "Influence of rootstock on productivity, growth and fruit size of late ripening European plums." Pp. T35. "Management studies with Swiss Bartlett on quince size-controlling

rootstock." Pp. T33. "Performance of pear cultivars on seedlings and Old-Home x Farmingdale clonal rootstocks." Pp. T34. "Performance of Swiss Bartlett on different size-controlling quince rootstocks." Pp. T34.

Tehrani, G. and Lay, J.W., 1989. Abstrs. in *Hort. Res. Inst. of Ont. Rpt. for 1985.* "Breeding for a seasonal succession of firm-fleshed, non-cracking, self-fruitful, black sweet cherry cultivar and determination of incompatibility of selections and cultivars." Pp.12-14. "Breeding for early maturing European and Japanese plum cultivars and pollen compatibility studies with plums." Pp. 37. "Rootstock and management studies in pear." Pp.33-36. "Rootstock and management studies in plum." Pp. 38-44. "Rootstock studies with sweet and tart cherries." Pp. 15-22.

Tehrani, G. and Menzies, D.R., 1989. "Vanier plum." *Hort. Res. Inst. of Ont. Rpt. for 1985.* Pp. 193-194.

Tehrani, G., Dale, A., Elfving, D.C., Fisher, K.H. and Miles, N.W., 1989. "Cultivar and rootstock collections in Institute plantings." Abstr. in *Hort. Res. Inst. of Ont. Rpt. for 1985.* Pp. 190-191.

Tehrani, G., Fisher, K.H. and Miles, N.W., 1989. "The Superior Stock Program -HES Vineland." Abstr. in *Hort. Res. Inst. of Ont. Rpt. for 1985.* Pp. 188-190.

Tenuta, A., Higgings, V.J. and Brammall, R.A., 1989. "The effect of Fusarium crown and root rot disease on the yield of fresh market tomato." Abstr. in *Hort. Res. in Canada. Can. Hort. Council.* Pp. V48-V49.

Valk, M., 1989. "Subsidence of organic soil." *Hort. Res. Inst. of Ont. Rpt. for 1985.* Pp. 240-250.

Valk, M., Elliot, R., Irwin, R.W. and Knibbe, E.N., 1989. "Soil management trial." Abstr. in *Hort. Res. Inst. of Ont. Rpt. for 1985.* Pp. 180.

Valk, M., Knibbe, E.N. and Burbidge, H., 1989. Abstrs. in *Hort. Res. Inst. of Ont. Rpt. for 1985.* "Crop management trials." Pp. 177-179. "Crop protection trials." Pp. 171-175. "Herbicide trials." Pp. 175-177. "Post-harvest physiology and storage trials." Pp. 180-187. "Vegetable cultivar evaluations." Pp. 169-171.

Wang, S. L., 1989. Abstr. "A new technique in extending the shelf life of pitted tart cherries." *Can. Inst. Food Sci. Technol. J.* 22(4):411.

Wang, S.L., 1989. Abstrs. in *Hort. Res. in Canada.* Can. Hort. Council. "Processing quality studies of raspberries." Pp. B13. "Quality studies of processing strawberries." Pp. B21.

Wang, S.L., 1989. "Minimally processed Fruits and Vegetables — A new perspective on Fresh Market." *The Grower.* 39(9):11.

Wang, S.L. and Rodrick, I.L., 1989. Abstrs. in *Hort. Res. Inst. of Ont. Rpt. for 1985.* "Application of improved freezing methods on fruits and vegetables." Pp. 116. "Quality monitoring techniques for processing tomatoes." Pp. 114. "Utilization of surplus and waste fruit and vegetable materials." Pp. 116-117.

Wang, S.L., and Smith, R.B., 1989. "Canning of CA-stored clingstone peaches." Abstr. in *Hort. Res. in Canada.* Can. Hort. Council. Pp. T30.

Wang, S.L., Courtney, W.H., Rodrick, I.L. and Banfield, G.E., 1989. "Processing quality studies on tomato. A. Screening new tomato cultivars for high solids and high paste consistency." Abstr. in *Hort. Res. Inst. of Ont. Rpt. for 1985.* Pp. 113.

Wang, S.L., Dale, A., Rodrick, I.L., Vandenberg, A.A. and Chandler, C., 1989. "Processing quality studies on small fruits." Abstr. in *Hort. Res. Inst. of Ont. Rpt. for 1985.* Pp. 115.

Wang, S.L., Miles, N.W., Gray, V.P., Rodrick, I.L. and Slingerland, K., 1989. "Processing quality studies on peaches." Abstr. in *Hort. Res. Inst. of Ont. Rpt. for 1985.* Pp. 114.

Wang, S.L., O'Sullivan, J., Rodrick, I.L. and Bouw, W.J., 1989. "Processing quality studies on bell peppers." Abstr. in *Hort. Res. Inst. of Ont. Rpt. for 1985.* Pp. 116.

Wang, S.L., Smith, R.B., Rodrick, I.L. and Skog, L., 1989. "Processing studies on stored peaches." Abstr. in *Hort. Res. Inst. of Ont. Rpt. for 1985.* Pp. 114-115.

Zilkey, B.F., Brammall, R.A., Reeleder, R.D., Capell, B.B., Beyaert, R.B., Verhoeve, V.G., Chipps, J.W., and Brown, D.A., 1989. "Effects of mulches on weed control and yield in first year ginseng." *Exp. Comm. on Weeds, Res. Rpt. East. Sect.* Pp. 405.

PROCEEDINGS

Brammall, R.A., 1989. "Black rot of cole crops." *Ont. Hort. Crops Conf.,* Feb. Vegetable session. Pp. 7-14.

Chiang, M.S., Chong, C., Crte, R. and Fréchette, S., 1989. "Fertility of anther-culture-derived 2x-plants in cabbage." *Proc. Can. Soc. Hort. Sci.* 28:50.

Chong, C. and Cline, R.A., 1989. "Growth of spiraea in containers amended with papermill sludge." *Proc. Can. Soc. Hort. Sci.* 28:46.

Chong, C., Cline, R.A. and Rinker, D.L., 1989. "Growing container nursery crops in mushroom compost-amended media." *86th Ann. Mtg. ASHS, Prog. & Abstrs.* Tulsa, Okla. Pp. 84.

Chong, C., Cline, R.A. and Rinker, D.L., 1990. "Spent compost as a potting soil for container nursery stock." *Ont. Hort. Crops Conf.* Feb. Mushroom Session. Pp. 4-10.

Chu, C.L., 1989. "Maturity indices of 'Red Delicious' apples in Ontario." *Proc. 5th International Controlled Atmosphere Res. Conf.* Wenatchee, Washington. June 14-16. Vol. 1. Pp. 91-101.

Cline, R.A., 1989. "Thirty years of diagnosing nutritional status of deciduous orchards and vineyards by leaf analysis in Ontario, Canada". *Program Proc. Intl. Symp. on Diagnosis of Nutritional Status of Deciduous Fruit.* Warsaw, Poland. July 25-28. Pp. 16.

Dale, A., McNicol, R.J., Moore, P.R. and Sjulin, T., 1989. "Pedigree analysis of red raspberry." *Acta Hortic.* 262:35-39.

Duggan, M. and Fuleki, T., 1989. "A quantitative method for the analysis for organic acids in grape, wine and juice using HPLC." *Proc. Can. Soc. Oenology and Viticulture Ann. Mtg.* 1987. Pp. 23.

Elfving, D.C., 1989. "N-(phenylmethyl)-1H-purine-6-amine (BA) as a chemical thinner for 'Idared' apple." *Acta Hortic.* 239:357-362.

Fuleki, T., 1989. "Potential of Vincent juice as natural food colourant." *Proc. Can. Soc. Oenology and Viticulture Ann. Mtg.* 1986. Pp. 37.

Fuleki, T. and Pelayo, E., 1989. "Determination of sugars, acids and alcohols using HPLC." *Proc. Can. Soc. Oenology and Viticulture Ann. Mtg.* 1989. Pp. 29.

Lauro, E.M. and Wismer, J.D., 1989. "Automation for controlled atmosphere storages." Paper No. 891635, *Am. Soc. Agric. Eng. Conf.,* New Orleans, Louisiana. Dec. 12. 14 Pp.

McKeown, A., 1990. "Early potatoes — potentials and pitfalls." *I.D.E.A.S. Conf. Proc.,* Hamilton. Jan. Pp. 23-24.

McKeown, A., 1990. "Manipulating the potato for best performance and stand." *Ont. Hort. Crops Conf.* Feb. Potatoes Session. Pp. 1-10.

Miles, N.W., Biggs, A.R., Svircev, A.M. and Chong, C., 1989. "Cytospora canker resistance in peach: Germplasm evaluation and genetic improvement." *Acta Hortic.* 254:85-90.

Miles, N.W., Svircev, A.M., Chong, C. and Biggs, A.R., 1989. Abstr. "In vitro generation of peach plants with resistance to the Cytospora canker pathogens." *Proc. Can. Soc. Hort. Sci.* 28:45.

O'Sullivan, J., 1990. "Melons." *I.D.E.A.S. Conf. Proc.* Hamilton. Jan. Pp. 24.

O'Sullivan, J. and Bouw, W.J., 1990. "Reduced rates of herbicides for sweet corn." *Weed Sci. Soc. Amer. Conf.* Montreal, Quebec. Feb. Pp. 24.

Rinker, D.L., 1990. "HRIO research report — 1989." *Ont. Hort. Crops Conf.* Feb. Mushroom Session. Pp. 1-3.

Rinker, D.L., 1989. "Response of oyster mushroom to supplementation prior to pasteurization." *Musbroom Sci. XII (Part II)*:187-198.

Rinker, D.L., Snetsinger, R. and Tetrault, R., 1989. "Control of sciarid fly with insecticides." *Musbroom Sci. XII (Part II)*:867-876.

Rosa, N., Reynolds, L.B. and McKeown, A., 1990. "Production profile for sweet potatoes in Ontario." *I.D.E.A.S. Conf. Proc.* Hamilton. Ont. Jan. Pp. 16-17.

Spadafora, V.J., Wuest, P.J. and Rinker, D.L., 1989. "Development of Verticillium disease in Pennsylvania mushroom crops." *Musbroom Sci. XII (Part II)*:753-763.

Straver, W.A., 1989. "The double stem training system for seedless cucumbers". *Proc. 1989 Ann. Amer. Grnbse Veg. Growers Conf.* Sacramento, CA. Pp. 17-21.

Sullivan, J.A. and Dale, A., 1989. "Intensive management of red raspberry in eastern Canada." *Acta Hortic.* 262:405-410.

Tehrani, G., 1990. "Pears in Ontario production and market potential." *I.D.E.A.S. Conf. Proc.* Hamilton. Jan. Pp. 62-67.

Tehrani, G. and Lay, J.W., 1989. "Performance of pear cultivars on seedlings and 'Old Home X Farmingdale' clonal rootstocks." *86th Ann. Mtg. ASHS, Prog. & Abstrs.* Tulsa, Okla. Pp. 136.

Wang, S.L., 1989. "Effect of several processing parameters on the quality of cryogenically frozen whole strawberries." *1989 IFT Ann. Convention, 50th Anniversary Prog. and Abstrs.* Chicago, Ill. Pp. 135.

BOOKS, THESES, REPORTS

Blom, T.J. and Piott, B.D., 1989. HES Res. Rpt. HRIO Vineland. *Effects of seedling dates and supplemental lighting on flowering of cineraria.* 5 Pp., *Evaluation of three peat/wool mixes with sub-irrigation and 3 different fertilizer rates.* 4 Pp., *Stem elongation of alstroemeria from day/night temperature regimes.* 1 Pp.

Blom, T.J., Piott, B.D. and MacPhail, M., 1989. *Evaluation of granulated rockwool in combination with sub-irrigation and 3 different fertilizer rates.* Project-Mumspr89. HES Tech. Rpt. HRIO Vineland. 6 Pp.

Bonn, W.G. and Elfving, D.C., 1989. *Response of crabapple cultivars to fire blight, 1988.* Biological and Cultural Tests for Control of Plant Diseases, Vol. 4. Ed. J.R. Hartman. St. Paul, Minn.: APS Press. Pp. 81.

Brammall, R.A. and Banfield, G.E. 1989. *Tomato cultivar assessment and vegetable pathology trials.* Res. Rept. No. 101. Hort. Exp. Stn., Simcoe. 42 Pp.

Cerkauskus, R.F. and McDonald, M.R., 1989. *Fusarium yellows of celery.* OMAF Factsheet Nov.

Chong, C., 1989. *Chemical protectants against roadside salt spray: Winter 1988-89 trials.* HES Res. Rpt. HRIO Vineland. 12 Pp.

Chong, C., 1989. Salt spray injury study: *Efficacy of film-forming chemicals for protecting roadside trees.* Toronto: Min. of Environ. Air Resources Branch. 33 Pp.

Chong, C., Cline, R.A. and Koole, M., 1990. *Growth of two Euonymus fortunei cultivars in Grow-Rich and other potting mixes.* HES Res. Rpt. HRIO Vineland. 17 Pp.

Chong, C., Halicki, G. and Vandenberg, A.A., 1989. *Tissue culture of strawberry selections. Progress report April 1, 1988 — March 31, 1989.* HES Res. Rpt. HRIO Vineland. 5 Pp.

Chu, C.L., 1989. *Overview of storage practices for Ontario grown apples.* Fruit and Vegetable Storage Notes. Tech. Note No. 3. HPL/HRIO Vineland. 2 Pp.

Chu, C.L. and Jennings, D.R., 1989. *Annual report on apple maturity and storage research.* HPL Res. Rpt. HRIO Vineland. 19 Pp.

Elfving, D.C., 1989. *Introduction for Drip irrigation — A method used under arid and desert conditions of high water and soil salinity,* by S.D. Goldberg and M. Shmueli, Trans. Amer. Soc. Agric. Eng. 13:38-41, 1970. In: Classical Papers in Horticultural Science. Ed. J. Janick. New York: Prentice Hall. Pp. 392-395.

Elfving, D.C. and Pierce, W.F., 1989. *SIGNAL — Apple Trials 1989.* Res. Rpt. No. 21. Hort. Exp. Stn., Simcoe. 42 Pp.

Forshey, C.G. and Elfving, D.C., 1989. *The relationship between vegetative growth and fruiting in apple trees. Horticultural Reviews, Vol. 11. Ed. J. Janick. Portland, OR: Timber Press. Pp. 229-287.*

Fuleki, T. and Pelayo, E., 1989. Chemical fingerprinting of fruits: Detection of fraudulent activity in fresh and processed fruits. HPL Rpt. HRIO Vineland. May. 13 Pp.

Fuleki, T. and Pelayo, E., 1990. *Chemical fingerprinting of fruits: Detection of fraudulent activity in fresh and processed fruits.* HPL Rpt. HRIO Vineland. Jan. 32 Pp.

Heslop, L.C., Compton, B.A. and O'Sullivan, J., 1989. *Mechanization of cucumber harvesting in Canada.* ASAE/CSAE Paper # 89-1075. June. 29 Pp.

Lauro, E.M., 1989. Ed: *Report of the On-farm energy and processing research sub-committee.* Submitted to the OAERSC. Oct. 23 Pp.

Lauro, E.M., 1989. *Time-temperature logging devices for the storage industry.* HPL Tech. Rpt. HRIO. Vineland. August. 3 Pp.

McDonald, M.R., Burbidge, H. and Flinn, P., 1989. *Muck Vegetable Cultivar Trials and Research Reports.* Res. Rpt. No. 39. Muck Res. Stn., Kettleby. 72 Pp.

McKeown, A.W., 1990. *Potato Breeding Trials. Ann. Prog. Rpt. of the Regional Potato Trials in Ontario 1989.* Pp. 20-24.

McKeown, A.W., 1990. *Potato, tomato and sweet potato production trials in 1989.* Res. Rpt. No. 102. Hort. Exp. Stn., Simcoe. 27 Pp.

O'Sullivan, J. and Bouw, W.J., 1989. *Growing pickling cucumbers.* OMAF Factsheet. April.

O'Sullivan, J. and Bouw, W.J., 1989. *Herbicide research report.* Res. Rpt. No. 104. Hort. Exp. Stn. Simcoe. Nov. 18 Pp.

O'Sullivan, J. and Bouw, W.J., 1989. *Pickling cucumber, muskmelon, squash and pepper cultivar trials.* Res. Rpt. No. 103. Hort. Exp. Stn. Simcoe. Nov. 33 Pp.

Riddle, Gordon E., 1989. *Literature review of integrated pest management in fruit crops.* Bibliography. 66 Pp.

Schumacher, B.R., 1989. *Effect of planting date, fall root development, and scape removal on the growth and yield of garlic (allium sativum L.).* M.Sc. Thesis. Univ. of Guelph. 109 Pp.

Schumacher, B.R., Baker, R., O'Sullivan, J., Bouw, W.J., McKeown, A.W., Reynolds, L.A., Brammall, R.A. and Banfield, G.E., 1989. *Vegetable Cultivar Trials 1989.* Res. Rpt. No. 100. Hort. Exp. Stn. Simcoe. Dec. 64 Pp.

Smith, R.B., Skog, L.J. and Nichols, J.A., 1990. *Master cooling trial and transport.* HPL Res. Rpt. HRIO, Vineland. 16 Pp.

Smith, R.B., Skog, L.J., Cline, R.A. and Nichols, J.A., 1989. *Cranberry trials 1987 and 1988.* HPL Res. Rpt. HRIO, Vineland. 15 Pp.

Smith, R.B., Skog, L.J., Nichols, J.A. and Uyenaka, J., 1989. *Late white cabbage storage trial.* HPL Res. Rpt. HRIO, Vineland. 9 Pp.

Smith, R.B., Skog, L.J., Nichols, J.A. and Vandenberg, A.A., 1990. *Modified atmosphere packaging biotechnology for fresh market strawberries.* HPL Res. Rpt. HRIO, Vineland. 13 Pp.

Smith, R.B., Skog, L.J., Nichols, J.A., Miles, N. and Slingerland, K., 1990. *Freestone peach cultivar storage trial 1989.* HPL Res. Rpt. HRIO, Vineland. 15 Pp.

Smith, R.B., Skog, L.J., Nichols, J.A., Schumacher, B.R. and Baker, R., 1989. *Onion cultivar storage trials.* HPL Res. Rpt. HRIO, Vineland. 10 Pp.

Straver, W.A. and Fluit, R.G., 1989. *The effect of EC on seedless cucumbers in rockwool.* HES Tech. Rpt. HRIO Vineland. 3 Pp.

Straver, W.A. and Fluit, R.G., 1989. *Substrates for seedless cucumbers.* HES Tech. Rpt. HRIO Vineland. 4 Pp.

Straver, W.A. and Fluit, R.G., 1989. *Training systems for greenhouse sweet peppers.* HES Tech. Rpt. HRIO Vineland. 5 Pp.

Straver, W.A. and Fluit, R.G., 1990. *Seedless greenhouse cucumber cultivars.* HES Tech. Rpt. HRIO Vineland. 5 Pp.

Tehrani, G., 1989. *Dwarf pear.* Niagara Pear Twilight Mtg. Handout. 14 Pp.

Tehrani, G., 1990. *A preliminary report on the performance of pear cultivars on seedling and 'Old Home X Farmingdale' clonal rootstocks.* Growers' Comm. Mtg. Ont. Tender Fruit Growers' Mktg. Bd. Handout. 10 Pp.

Tehrani, G., Miles, N.W. and Elfving, D.C., 1988. *Training and pruning fruit trees.* (Rev.) OMAF Publication 392. 39 Pp.

Wang, S.L., 1989. *Extending the shelf life of freshly pitted cherries.* HPL Tech. Rpt. HRIO, Vineland. 17 Pp.

Wang, S.L., 1989. *Modified atmosphere packaging of freshly pitted cherries.* HPL Tech. Rpt. HRIO, Vineland. 6 Pp.

Wang, S.L., 1989. *Progress report on the strawberry processing research.* HPL Res. Rpt. HRIO, Vineland. 9 Pp.

Wang, S.L. and Barkovic, L.H., 1990. *Carrot juice processing with Ontario-grown carrot varieties.* HPL Tech. Rpt. HRIO, Vineland. 6 Pp.

Wilson, K.R. and Elfving, D.C., 1989. *Producing quality Empire apples.* OMAF Factsheet. Sept.

KEMPTVILLE COLLEGE OF AGRICULTURAL TECHNOLOGY

PERIODICALS

Drevjany, L.A., 1989. "Check bad calf habits." *Farm and Country.* Sept.19.

Drevjany, L.A., 1989. "Interpret calf signs." *Farm and Country.* June 20.

Drevjany, L.A., 1989. "Learn your calf language." *Farm and Country.* April 25.

Drevjany, L.A., 1989. "Reading those calf signals." *Farm and Country.* May 9.

Drevjany, L.A., 1989. "The language of calves." *Grainews.* Series of articles: Oct., Nov., Dec.

Drevjany, L.A., 1989. "The language of calves." *Higblights of Agri. Res. in Ont.* 1 (3):14-15.

Drevjany, L.A., 1989. "Understand and treat calf signs." *Farm and Country.* Sept. 5.

Drevjany, L.A., 1989. "What the calf can tell you." *Farm and Country.* May 23.

Drevjany, L.A., 1990. "There is much more to colostrum." *Grainews.* Jan.

Drevjany, L.A., McKnight, D.R., Gowenlock, D. and Veira, D., 1989. "Holsteins can produce more than milk: beefing qualities of male calves." *The New Holstein Association of Canada.* Vol. 12. No.1.

Johnson, P.L. and Stanley, D., 1989. "Restructuring beef: a silk purse from a sow's ear." *Higblights of Agr. Res. in Ont.* 12 (4):9.

Langenberg, W.J. and Butler, W.J., 1989. "Maple syrup: measuring density." *OMAF Factsbeet.* Agdex 310/70 (89-111).

MacDonald, D.W. and Rowan, M.L., 1989. Abstrs. in *Res. Rpt. of Exp. Comm. on Weeds, Eastern Sec.:* "Herbicide evaluation in seedling alfalfa." Pp. 12, "Fenoxaprop-Ethyl on barley varieties." Pp. 47, "Grass and broadleaf weed control in barley." Pp. 48, "Grass control in canola." Pp.69; "Herbicide evaluation in corn." Pp. 126-131.

McKnight, D.R., 1989. "Beef up your cull dairy cows." *Holsteins Now.* Sept./Oct. Pp.12.

McKnight, D.R., Wheeler, E.E. and Drevjany, L.A., 1989. "Effect of lasalocid on feedlot performance of cull Holstein dairy cows." Abstr. *Can. J. Anim. Sci.* 69 (4) Pp. 1126.

Sanderson, J.L., 1989. "Canada's new labelling: how do I use it?" *Diabetes Dialogue.* Spring 1990. Pp. 53-57.

Wheeler, E.E., 1989. "Balancing rations . . . and then some." *Holsteins Now.* Nov.-Dec. Pp. 12.

Wheeler, E.E., 1989. "Manger surfaces compared." *Dairy Guide.* Dec. Pp.D-8.

PROCEEDINGS

Drevjany, L.A., 1989. "Beef properties of Canadian Holsteins." *Intl. Symp. in Dairy Management.* Czechoslovakia. Sept.

Drevjany, L.A., 1989. "Raising replacement heifers." *Intl. Symp. in Dairy Management.* Czechoslovakia. Sept.

Drevjany, L.A., 1989. "Raising replacement heifers up to six months." *Eastern Ont. Dairy Day.* Kemptville. Dec.; *Central Ont. Dairy Day.* Shakespeare. Dec.; *Western Ont. Dairy Day.* Sunderland. Dec.

Drevjany, L.A., 1989. "Refining the heavy calf program." *Purina Dairy Symp.* Truro, N.S. Dec.

Forbes, E.K., 1989. "Garnishes." *Gifted Elementary Students' Seminars.* Leeds and Grenville County Board of Education, Kemptville. May.

Hunter, T.L., 1989. "Sanitation and Safety." *Visiting Homemakers.* Kemptville. April.

Johnson, P.L., 1990. "WordPerfect for food service managers." *Food Service Supervisors and Dietitians' Workshop.* Kemptville. Jan.

Langenberg, W.J., 1990. "Physiology of maple sap flow." *Ont. Maple Syrup Producers' Assoc.* St. Jacobs. Jan. Pp.4.

Madill, J.E., 1989. "Report on field trials of varieties and mixtures." *Ont. Forage Crop Investigation.* KCAT Test Results.

Reasbeck, L.M., 1990. "Career changes and challenges for food service managers." *Food Service Supervisors' Workshop.* Ottawa and Kemptville. Jan. and Mar.

Reasbeck, L.M., 1990. "Food science and technology: the training program, its graduates and the food industry." *Canadian Food Service Executives' Assoc.* Ottawa Chapter. Kemptville. Feb.

Reasbeck, L.M., 1990. "Food science and technology: the training program, its graduates and their career potential." *Rotary Club of Kemptville.* Kemptville. Feb.

Reasbeck, L.M., 1990. "Food Service management in-service training and continuing education programs for food service supervisors." *The Canadian Food Service Supervisors' Assoc. Directors' Meeting.* Toronto. Feb.

Sanderson, J.L., 1989. "Nutrition for the elderly." *Visiting Homemakers' Seminar.* Kemptville. Apr.

Strader, A., 1989. "Kitchen herb gardening." *Gifted Elementary Students' Seminar.* Leeds and Grenville County Board of Education. Kemptville. May.

BOOKS, THESES, REPORTS

Curnoe, W.E., 1990. *Report of O.S.W.A.R.S.C. to O.A.S.C.C.* London, Jan. Pp. 25.

Curnoe, W.E., Hoekstra, G.J., Langenberg, W.J., MacDonald, D.W., Madill, J.E. and Morton, J.G., 1990. *Plant Science Ann. Rep.* K.C.A.T. Feb. 185 Pp.

Drevjany, L.A., McKnilght, D.R. and Wheeler, E.E., 1988-1989. *Animal Science Ann. Rep.* K.C.A.T.

Hoekstra, G.J., 1988-1990. *Rep. Ont. Hybrid Corn Perf. Trials.* Ont. Corn Comm. R.C.A.T. Dec. Hoekstra, G.J., 1989. *Ann. Rep. on Cooperative Winter Wheat Variety Trials.* Univ. of Guelph. Guelph. Nov.

Hoekstra, G.J., 1989. *Progress Rep. on Barley, Oats and Wheat;* Reg. tests in Ont. Univ. of Guelph. Guelph. Nov.

Hoekstra, G.J., 1989. *Rep. on Eastern Cooperative Barley, Oats and Spring Wheat Tests.* P.R.C. (Ottawa Research Stn.) Rpts.

Hossie, W.R. and Langenberg, W.J., 1989. *Eastern Ont. Sweet Corn Cultivar Performance Trials.* K.C.A.T. Sweet Corn Rep. Pp. 4.

Langenberg, W.J. and Hossie, W.R., 1989. *Asparagus Cultivar Evaluation Trials.* Ont. Asparagus Res. Comm. London. Nov. Pp.3.

Langenberg, W.J. and Hossie, W.R., 1989. *Potato Cultivar Evaluation.* Ont. Potato Res. Comm. Guelph. Nov. Pp. 4.

Langenberg, W.J. and Hossie, W.R., 1989. *Sweet Corn Cultivar Evaluation Trials.* Ont. Sweet Corn Res. Comm. Simcoe. Nov. Pp. 30.

NEW LISKEARD COLLEGE OF AGRICULTURAL TECHNOLOGY

PERIODICALS

Hughes, B.R., 1989. "Preparing Your Garden For Winter. Part 1. Evergreens." *Temiskaming Speaker.* Nov.

Hughes, B.R., 1989. "Preparing Your Garden For Winter. Part 2. Deciduous Trees and Shrubs." *Temiskaming Speaker.* Nov.

Hughes, B.R. and Rowsell, J.G., 1989. "Contact North Cuts Across the Miles." *OMAF News.* Oct.

PROCEEDINGS

Gumprich, P.S., 1990. "Beef Research Results from NLCAT." *Proc. North Eastern Ont. Agric. Conf.*, NLCAT. Feb. Pp.D6-D7.

Hawkins, B.C., 1990. "Drying Alfalfa Seed". *Proc. North Eastern Ont. Agric. Conf.*, NLCAT. Feb. Pp.A-8.

Kirik, M., 1990. "Natural Air Grain Drying". *Proc. North Eastern Ont. Agric. Conf.*, NLCAT. Feb. Pp.A9-A10.

Sharpe, P.H., 1990. "Grazing Steers at NLCAT." *Proc. North Eastern Ont. Agric. Conf.*, NLCAT. Feb. Pp.D4-D5.

Skepasts, A.V., 1990. "$200/ha Profit from Barley — Is It Really Possible?" *Proc. North Eastern Ont. Agric. Conf.*, NLCAT. Feb. Pp.A-11.

BOOKS, THESES, REPORTS

Heard, J., Ablett, G.R., Michaels, T.E., O'Toole, J.J. and Forrest, R.E., 1990. *Production of Narrow-Row Direct Harvest White Beans in Ontario.* OMAF Factsheet. No. 90-058.

Heard, J., Bliss, K., Skepasts, A.V., Rowsell, J.G., Leggett, D. and Bowman, M., 1990. 1989 *Annual Report of CropCheck North.* NLCAT Report. Mar. Pp.18.

Rowsell, J.G., Skepasts, A.V., Bowman, M. and Leggett, D., 1990. *Crop Investigations Near Verner in 1989.* NLCAT Report. Jan. Pp.28.

Rowsell, J.G., 1990. *Des terres menacées.* La Gestion Des Terres. Module 1. Pp.1.1-1.5.

Rowsell, J.G., 1990. *La dégradation du sol.* La Gestion Des Terres. Module 5. Pp.5.1-5.7.

Rowsell, J.G., 1990. *L'érosion du sol.* La Gestion Des Terres. Module 4. Pp.4.1-4.7.

Rowsell, J.G., 1990. *L'évaluation des ressources en sol.* La Gestion Des Terres. Module 3. Pp.3.1-3.6.

Rowsell, J.G., 1990. *Qu'est-ce que le sol?* La Gestions Des Terres. Module 2. Pp.2 1-2.11.

Skepasts, A.V., Rowsell, J.G., Leggett, D. and Bowman, M., 1989. *Progress Report, Barley, Oats, Winter Barley, Winter Wheat, Winter Triticale Ontario Regional Tests.* NLCAT Results.

Skepasts, A.V., Rowsell, J.G., Leggett, D. and Bowman, M., 1989. *Report on Field Trials of Varieties and Mixtures. Ontario Forage Crop Investigations.* NLCAT Results.

RIDGETOWN COLLEGE OF AGRICULTURAL TECHNOLOGY

PERIODICALS

Ablett, G.R., 1989. U.S.D.A. *Uniform Soybean Tests,* Northern States — Uniform I, 46-58; Uniform II, 72-99; Preliminary IIA, 100-119, Preliminary IIB, Pp. 120-139.

Ablett, G.R., 1989. *1990 Report Ontario Soybean Variety Trials* — Tables 1-3.

Ablett, G.R., 1990. "Getting to the Recommended List. It's a Tough Journey." *The Emerging Bean.* Spring 1990, Pp. 5-6.

Ablett, G.R., Beversdorf, W.D. and Dirks, V.A., 1989. "Performance and Stability of Indeterminate and Determinate Soybean in Short-Season Environments". *Crop Sci.* 29:1428-1433.

Brown, R.H., 1989. *Research Rept.*, Expert Committee on Weeds, Eastern Section. "Metribuzin combinations in field corn 1." Pp. 79. "Metolachlor combinations for weed control in field corn 2." Pp. 80. "S53482 (pre) in field corn 3." Pp. 81. "Postemergence sulfonyl urea in field corn 4." Pp. 82. "Postemergence treatments in field corn 5." Pp. 83. "Acetochlor formulations for weed control in field corn 6." Pp. 84. "SAN 582 (ppi) in field corn 7." Pp. 85. "Field corn

8." Pp. 86. "SAN 582 (post) for weed control in field corn 9." Pp. 87. "Dicamba combinations for field corn 10." Pp. 88. "EPTC + metribuzin combinations for weed control in field corn 11." Pp. 89. "SAN 582 (pre) in field corn 12." Pp. 90. "SAN 582 (pre) in field corn 13." Pp. 91. "Bentazon/additives in field corn 15." Pp. 92. "Soybeans and Peanuts — Summary." Pp. 167. "Weed control in apples." Pp. 366. "Weed control in cherries." Pp. 368. "Weed control in peaches." Pp. 369. "Tomatoes — summary." Pp. 381. "PPI combinations for transplanted tomatoes 1." Pp. 382. "Graminicides X adjuvants in transplanted tomatoes 2." Pp. 383. "SAN 583 and metolachlor in transplanted tomatoes 3." Pp. 384. "Postemergence graminicides in transplanted tomatoes 4." Pp. 385. "Postemergence graminicides for transplanted tomatoes 5." Pp. 386. "Preplant incorporated treatments for nightshade and annual weed control in transplanted tomatoes 6." Pp. 387. "Preplant incorporated herbicides for nightshade and annual weed control in transplanted tomatoes 6A." Pp. 388. "MON 15100 formulation comparisons for preemergent crabgrass control in turf 2." Pp. 454. "Preemergence crabgrass control in turf 3." Pp. 455. "Formulated mixes of fenoxaprop for crabgrass control in turf 5." Pp. 456.

De Schutter, A.C., 1989. "A comparison of heat processed full-fat soybean meals for starter pigs." *Ontario Swine Research Review.* Pp. 19.

De Schutter, A.C., 1989. "Full-fat soybeans change carcass." *Hog Market Place Quarterly.* Fall. Pp. 36.

De Schutter, A.C. and Osborne, W.R., 1989. "The effect of heat processing method of the feeding value of full-fat soybeans and acceptability of pork." *Ontario Swine Research Review.* Pp. 19.

De Schutter, A.C. and Osborne, W.R., 1989. "The effect of inclusion rate of full-fat soybeans on carcass quality of swine." *Ontario Swine Research Review.* Pp. 112.

Dinnissen, S.M., 1989. "An evaluation of feed grain marketing facilities for Temiskaming." *Highlights of Agric. Res. in Ont.* 12(3):17-18.

Dinnissen, S.M., 1990. "Agricultural market assessment." *Farming Today, Leamington Post, Simcoe Reformer, Chatham Daily News, St. Thomas Times Journal, Woodstock Sentinel Review, Cambridge Reporter newspapers.* Jan. 10, Feb. 22, Mar. 8, Mar. 22.

Doidge, B.R., 1989. "Agricultural market assessment." *Farming Today, Leamington Post, Simcoe Reformer, Chatham Daily News, St. Thomas Times Journal, Woodstock Sentinel Review, Cambridge Reporter newspapers.* Oct. 26; Nov. 2, 9, 16, 23, 30; Dec. 7, 14, 21, 28.

Doidge, B.R., 1989. "Assessing marketing tool performance: 1988/89." *Ontario Corn Producer.* June 5(2):14-17.

Doidge, B.R., 1989. "Corn market fundamentals." *Ontario Farmer.* 22(7):10B, 22(9):10B, 22(11):6B, 22(13):32, 22(15):28, 22(17):34, 22(19):28, 22(21):22, 22(27):18B, 22(29):12B, 22(31):18B, 22(33):30, 22(35):20B, 22(37):20B, 22(39)10B, 22(41):24B, 22(43):22B.

Doidge, B.R., 1989. "Marketing information sources." *Ontario Corn Producer.* October 5(5):6-17.

Doidge, B.R., 1989. "Market trends." *Ontario Corn Producer.* 4(10):13, 5(1):15, 5(2):9-10, 5(3):7, 5(4):10, 5(5):14-15, 5(6):11.

Doidge, B.R., 1989. "The grain trade in Ontario." *Ontario Corn Producer.* December 5(6):8-17.

Doidge, B.R., 1990. "Agricultural market assessment." *Farming Today, Leamington Post, Simcoe Reformer, Chatham Daily News, St. Thomas Times Journal, Woodstock Sentinel Review, Cambridge Reporter newspapers.* Jan. 4, 10, 18, 25; Feb. 1, 8, 15; Mar. 1, 15, 29.

Doidge, B.R., 1990. "Basis outlook for 1989/90 grain corn." *Ontario Corn Producer.* March 5(8):16-35.

Doidge, B.R., 1990. "Corn market fundamentals." *Ontario Farmer.* 22(45):28, 22(47):30, 22(49):22B, 22(51):26, 23(1):6D, 23(3):8C, 23(5):10B.

Doidge, B.R., 1990. "Market information by satellite." *Agricultural Computer Extension Newsletter.* 9(1):1-6.

Doidge, B.R., 1990. "Market trends." *Ontario Corn Producer.* 5(7):22, 5(8):24-25, 5(9):21.

Evans, F.D., Evans, N.M., Hacker, R.R., Morris, J.R. and Osborne, V.R., 1989. Administration of pst to hogs in the starter-grower vs. finisher phase of growth. 1988 *Ontario Swine Review.* OAC Publ. 0689:44-45.

Frank, R., Braun, H.E., Clegg, B.S., Ripley, B.D. and Johnston, R.W., 1990. "Survey of farm wells for pesticides in Ontario, Canada 1986 and 1987." *Bull. Environ. Contam. Toxicol.* 44:410-419.

Loewen, S.A., 1989. *Abstrs. in Ontario Tomato Res. Projects Ontario Tomato Comm.* "Multilocation wholepack tomato cultivar trial, 1989.", "Wholepack tomato breeding, 1989.", "Wholepack tomato cultivar screening trials.", "Wholepack tomato processing trial, 1989."

Morris, J.R., 1989. "Consider sow feeding guide." *Hog Market Place Quarterly.* Spring. Pp. 84-85.

Morris, J.R., 1989. "Strive for excellence." *Hog Market Place Quarterly.* Winter. Pp. 32.

Morris, J.R. and Jackson, W., 1990. "The effect of preshipping feeding regime and transportation time on the amount of shrink in finished steers." *Beef Research Update.* OAC publication no. 04900:45-46.

Morris, J.R., Underwood, J.A., Fraser, D. and Phillips, P., 1989. "A retrofit two-tiered penning system for growing-finishing pigs." (Abstr.) *Canadian J. of Anim. Sc.* 69:1124.

Morris, J.R., Underwood, J.A., Fraser, D. and Phillips, P. 1989. "The effect of free-access, two-tiered pens on growth performance and carcass merit characteristics of growing-finishing pigs." 1988 *Ontario Swine Review.* OAC Publ. 0689:23-25.

Nanni, C. and Baldwin, C.S., "Seeing the forest and the trees — update on agroforestry in S.W. Ontario." *Highlights Agric. Res. Ont.* 2(2).

Osborne, V.R. and Buchanan-Smith, J.G., 1989. "Evaluation of protein supplements with alfalfa silage for growing beef calves." (Abstr.) *Canadian J. of Anim. Sc.* 69:11-37.

Pitblado, R.E., 1989. Abstrs. in *Can. Hort. Council Res. Rpt.* "Effect of seed treatments on the emergence and survival of super sweet corn cultivars.", "Screening fungicides for disease control in field tomatoes.", "The use of oil, oil concentrates and surfactants to improve the control of pepper pests.", "Control of stink bug damage in field tomatoes.", "Transplant water treatments for field tomatoes."

Pitblado, R.E., 1989. Abstrs. in *Exp. Comm. on Pesticide Use in Agr.* "Screening foliar insecticides in sweet corn." Pp. 64. "Chemical and biological control of European corn borers in peppers." Pp. 72. "Use of oils, oil concentrates and surfactants in processing field peppers." Pp. 73. "Control of stink bug damage in field tomatoes." Pp. 107. "Screening fungicides for disease control in field tomatoes 1." Pp. 188. "Screening fungicides for disease control in field tomatoes 2." Pp. 189. "Comparison between the fungicides Easout 70WP and Truban 30WP on the emergence and growth of seedling tomatoes." Pp. 190. "Effect of foliar fungicides on the growth of seedling tomatoes 1." Pp. 191.

Pitblado, R.E., 1989. Abstrs. in *Ontario Tomato Res. Projects, Ontario Tomato Committee.* "Comparison of several fungicide spray models." Pp. 23. "Disease incidence in twin versus single rows in field tomatoes." Pp. 27. "Screening fungicides for disease control in field tomatoes." Pp. 29. "Transplant water treatments for field tomatoes." Pp. 31. "Control of stink bug damage in field tomatoes." Pp. 33. "Rate of dissipation of tomato fungicide residues using two methods of timing

applications." Pp. 34. "Tomato transplant treatments prior to field setting." Pp. 37.

Pitblado, R.E., 1988. "Development of a weather-timed fungicide spray program for field tomatoes." *Can. J. Plant Path.* Vol. 10(4).

Pitblado, R.E., Allen, W.R., Matteoni, J.A., Garton, R., Shipp, J.L. and Hunt, D., 1990. "Introduction of the tomato spotted wilt virus — western flower thrips complex into field vegetables in Ontario, Canada". *Plant Dis.* 74:320.

Ross, R.W., 1989. "ACCPAC plus — still the queen of accounting packages." *TXT Newsletter.* April. 6:1, Pp. 8-9.

Ross, R.W., 1989. *Agricultural Computer Extension Newsletter.* "Agricultural personal computer users' groups.", May. 8:1, Pp. 1. "Hard disk management — preventing data loss." May. 8:1, Pp. 2-3. "Agricultural computer users' groups." May. 8:1, Pp. 8. "Where we're going." May. 8:1, Pp. 8.

Ross, R.W.,1989. *Agricultural Computer Extension Newsletter.* "Computer viruses — the real story." Oct. 8:2, Pp. 4-7. "Agricultural computer users' groups." Oct. 8:2, Pp. 8. "Where we're going." Oct. 8:2, Pp. 8.

Ross, R.W., 1989. "Computer viruses — the real story." *TXT Newsletter.* Nov. 6:3, Pp. 5-6.

Ross, R.W., 1989. "Computer viruses — the real story." *Gambit Newsletter.* Nov. 1:9, Pp. 7.

Ross, R.W., 1989. "Hard disk management — preventing data loss." *TXT Newsletter.* May. 6:2, Pp. 7-8.

Ross, R.W., 1989. *Kellogg Farm Management Unit Newsletter* Pp. 3-6. "A cautionary tale.", "Hard disk management.", Canterbury New Zealand, April.

Ross, R.W.,1989. "Of things computing — buying a computer." *Gambit Newsletter.* Dec. 1:10, Pp. 4-5.

Ross, R.W., 1990. *Agricultural Computer Extension Newsletter.* "Choosing a CPU." Mar. 9:1, Pp. 4. "BusinessVision II — an abbreviated review." Mar. 9:1, Pp. 7. "Agricultural Computer Users' Groups." Mar. 9:1, Pp. 8.

Ross, R.W., 1990. "Business Vision II: an accounting alternative." *Computing Canada, Micro Report.* Jan. 5:1, Pp. 31.

Ross, R.W., 1990. "Buying a computer — part I." *TXT Newsletter.* Jan. 6:5, Pp. 3-5.

Ross, R.W., 1990. "Of things computing — disk technology and terminology." *Gambit Newsletter.* Mar. 2:3, Pp. 6-7.

Ross, R.W., 1990. "Of things computing — monitors and adaptors." *Gambit Newsletter.* Feb. 2:2, Pp. 5-6.

Ross, R.W.,1990. "Of things computing — questions and answers." *Gambit Newsletter.* Jan. 2:1, Pp. 6-7.

Ross, R.W., 1990. *TXT Newsletter.* "Buying a computer — part II." Feb. 6:6, Pp. 3-5. "BusinessVision II — a viable Canadian mid-market alternative." Feb. 6:6, Pp. 5-7.

Schaafsma, A.W., 1990. Abstrs. in *Exp. Comm. on Pesticide Use in Agr.* "Comparison of banded foliar insecticides for the control of potato leafhoppers in adzuki beans." Pp. 41. "Evaluation of banded foliar applications of CYGON 480E timed to cultivations for the control of potato leafhoppers in adzuki and white beans." Pp. 42. "Evaluation of banded applications of granular insecticides applied near planting time to control potato leafhoppers in adzuki beans." Pp. 43. "Control of first generation European corn borer larvae in seed corn with FUTURA biological insecticide." Pp. 57. "Evaluation of phytotoxicity of candidate insecticides used to control corn rootworms, comparing T-band and in-furrow methods at planting time." Pp. 61. "Evaluation of candidate insecticides to control corn rootworms, comparing T-band and in-furrow methods at planting time." Pp. 62. "Phytotoxicity of insecticide seed treatments applied to soybeans with fungicide seed treatments and stored for various periods prior to planting." Pp. 101. "Control of two-spotted spider mite in soybeans with foliar applications of dimethoate." Pp. 102. "Slug control in field corn with insecticides applied as a band over the row at the 3 to 4 leaf stage." Pp. 115. "Seed treatments for the control of Rhizoctonia root rot in soybeans." Pp. 187. "Evaluation of foliar fungicide treatments to control foliar and head diseases in winter wheat.", Pp. 254 and Pp. 256. "Evaluation of fungicide seed treatments to control powdery mildew in winter wheat." Pp. 255.

Schaafsma, A.W., 1990. "Control of the potato leafhopper in dry edible beans." *The Emerging Bean.* Spring. Pp. 15-16.

Shaw, J.E., 1989. *Research Rpt., Expert Committee on Weeds, Eastern Section.* "Postemergence herbicides in winter wheat." Pp. 55. "Residual herbicide carryover on winter wheat." Pp. 56. "Preplant incorporated herbicides for weed control I." Pp. 276. "Preplant incorporated herbicides for broadspectrum weed control in soybeans II." Pp. 277. "Weed control in soybeans with herbicide impregnated fertilizer." Pp. 278. "Preemergent herbicides for weed control in soybeans I." Pp. 279. "Preemergence herbicides for weed control in soybeans II." Pp. 280. "Preemergence treatments for weed control in soybeans III.", Pp. 281. "Postemergence grass control in soybeans with UBI 9076." Pp. 282. "Annual grass control in soybeans." Pp. 283. "Postemergence treatments for broad spectrum weed control in soybeans." Pp. 284. "Postemergence broadleaf weed control in soybeans." Pp. 285. "Annual grass control in white and kidney beans." Pp. 335. "Broadleaf weed control in white and kidney beans." Pp. 336. "Weed control in white and kidney beans." Pp. 337. "Adzuki bean tolerance to herbicides." Pp. 345. "Herbicides for weed control in peas." Pp. 425. "Weed control with AC263,499 in processing peas." Pp. 426. "Potatoes — Summary." Pp. 435. "Postemergence grass control in potatoes." Pp. 450. "New herbicides for weed control in potatoes." Pp. 451. "MON 15100 formulation comparisons for preemergent crabgrass control in turf 2." Pp. 454. "Conservation tillage and weed management. Summary." Pp. 491. "Integrated weed control in reduced tillage corn." Pp. 493. "Fall vs. spring application of burndown herbicides for alfalfa cover crop control in no-till corn." Pp. 496. "Burndown of alfalfa cover crop and residual weed control in no-till corn." Pp. 497. "Rye cover crop and residual weed control in no-till corn." Pp. 498. "Wheat cover crop and residual weed control in no-till corn." Pp. 499. "Burndown and residual weed control in no-till corn with glyphosate." Pp. 500. "Burndown and residual weed control in no-till corn with paraquat and glufosinate." Pp. 501. "Residual herbicides for burndown and residual control in no-till corn." Pp. 502. "Additives with residual herbicides for burndown and residual weed control in no-till corn." Pp. 503. "Band herbicide applications in no-till corn.", Pp. 504-505. "Fall vs. spring burndown applications for alfalfa cover crop control in no-till soybeans." Pp. 506. "Burndown of alfalfa cover crop and residual weed control in no-till soybeans." Pp. 507. "Rye cover crop and residual weed control in no-till soybeans." Pp. 508. "Wheat cover crop and residual weed control in no-till soybeans." Pp. 509. "Wheat cover crop burndown with glyphosate." Pp. 510. "Burndown and residual weed control in no-till soybeans with glyphosate." Pp. 511. "Burndown and residual weed control in no-till soybeans with paraquat and Hoe 39866." Pp. 512. "Residual herbicide for burndown and residual weed control in no-till soybeans." Pp. 513. "Additives with residual herbicide for burndown and residual control in no-till soybeans." Pp. 514. "2,4-D residual study in no-till soybeans." Pp. 515. "Herbicides for fall burndown and weed control in ridge tillage." Pp. 516. "Herbicides for weed control in ridge tillage." Pp. 517. "Herbicides for weed control in oil seed radish." Pp. 518. "Herbicides for burndown and control of oil seed radish." Pp. 519. "Herbicides for control of the bur cucumber." Pp. 556. "Herbicides for control of swamp smartweed." Pp. 582.

Shaw, J.E., 1990. "Perennials replace annuals in reduced tillage." *SWEEP Newsletter.* Issue 5. Winter.

Shaw, J.E., 1990. "Weed control in soybeans: the battle continues." *Beans in Canada Agri-Book Magazine.* Mar. Vol. 16. Pp. 22.

Smid, A.E., 1989. "Sowing wheat for a 1990 harvest." *Ontario Farmer. Sept. and Voice of the Kent Farmer.* Sept.

Stevenson, C.K., 1989. "Nitrogen levels on winter wheat." *Voice of the Kent Farmer.* 22(18):10.

Stevenson, C.K., 1990. "Nitrogen sources for corn." *Ontario Corn Producer.* 5(9):6&29.

Underwood, J.A., 1989. "Pressure effects on spray pattern distribution from 80° and 110° flat fan nozzles." *Abstr. Exp. Comm. on Weeds Res. Rpt. East Sect.*

PROCEEDINGS

Ablett, G.R. and Schaafsma, A.W., 1989. "Effect of defoliation on yield, maturity and seed size of white beans." *Proc. Internat. Bean Improvement Comm.* Nov. 9.

Ablett, G.R., Buzzell, R.I. and Beversdorf, W.D., 1989. "Stability comparisons among indeterminate and semideterminate soybean lines." *Agronomy Abstracts, Am. Soc. and Agronomy Mtgs.* Las Vegas, Nevada. Oct. 15-20. PP. 72.

Baldwin, C.S., 1989. "Agroforestry and soil and water conservation at the provincial level." *6th Intl. Soil Con. Conf.* Ethiopia, Kenya, East Africa. Nov. 6-18.

Baldwin, C.S., 1989. "Soil and water conservation: county or provincial thrust?" *44th Ann. Mtgs. of the S.W.C.S.* Edmonton, Alta. July 30-Aug. 2.

Baldwin, C.S., 1989. "Soil conservation — economics or emotion." *1st Ann. Mtg. Soil Con.* Canada. Winnipeg, Manitoba. Mar. 30-Apr. 1.

Baldwin, C.S. and Nanni, C., 1989. "Living windbreaks: the basis of future crop production." *1st Conf. Agrofor.* in N.A. Guelph. Aug. 13-16.

De Schutter, A., 1990. "More findings on full-fat beans." 1990 *Swine Research Update.*

De Schutter, A., 1990. "More findings on full-fat beans." 1990 Southwest. Ont. *Pork Producers' Conf.* R.C.A.T. Feb.

Dinnissen, S.M., 1990. "The international trade situation in agriculture." *Proc. North Eastern Ont. Agric. Conf.* N.L.C.A.T. Feb. 27. 1-8.

Doidge, B.R., 1990. "1990 outlook — grain corn and soybeans." *Proc. Huron County Soil and Crop Association annual meeting.* Brussels., Jan.

Doidge, B.R., 1990. "1990 outlook — grain corn and soybeans." *Proc. Middlesex County O.M.A.F. Bankers' Day Seminar.* London. Jan.

Doidge, B.R., 1990. "1990 outlook — grain corn and soybeans." *Proc. Kent County Corn Producers Association annual meeting.* Chatham. Jan.

Doidge, B.R., 1990. "Agriculture in the 1990s." *Proc. Wilson's Mills Annual Growers' Meeting.* Stouffville. Mar.

Doidge, B.R., 1990. "Marketing alternatives." *Proc. Halton Soil and Crop Association Meeting.* Milton. Mar.

Doidge, B.R., 1990. "Marketing alternatives." *Proc. Kent County O.M.A.F. Bankers' Day Seminar.* Chatham. Feb.

Doidge, B.R., 1990. "The grain trade in Ontario." *Proc. Southwest. Ont. Farmers' Week.* Ridgetown College. Jan. Pp. C1-12.

Doidge, B.R., 1990. "U.S.D.A. 1990 farm bill and implications." *Proc. Pioneer Hi-Bred Corn and Bean Day.* Mount Elgin. Feb.

Johnston, R.W., 1990. "Micronutrients in crop production in Ontario." *Proceedings Hort.* Toronto. Feb.

Loewen, S.A., 1990. "Tomato variety performance — past and present." *Proc. S.W. Ont. Farmers' Week.* R.C.A.T. Jan.

Morris, J.R., 1990. "Information on new technology in the Danish, Dutch, and English port industries." *Central Ontario Farmers' Week.* Lindsay. Jan.

Morris, J.R., 1990. "Porcine somatotropin update." *Central Ontario Farmers' Week.* Lindsay. Jan.

Morris, J.R., 1990. "Rethinking sow housing." *Proc. 28th S.W. Ont. Pork Conf.* Feb. 23, 1990, Pp. H1-5.

Morris, J.R., 1990. "Towards better animal care." *Proceedings of the Swine Excellence Series.* Feb. 12-16.

Pitblado, R.E., 1990. "Tomato spotted wilt virus (iii) the field and southern situation." *Proc. Southwest. Ont. Farmers' Week.* R.C.A.T. Jan. 5.

Pitblado, R.E., 1990. "Tom-cast update." *Proc. Southwest. Ont. Farmers' Week,* R.C.A.T. Jan. 5.

Pitblado, R.E., 1990. "Wireworm control — a harm or benefit." *Proc. Southwest. Ont. Farmers' Week.* R.C.A.T. Jan. 5.

Ross, R.W., 1990. "Can I make a computer pay?" *Simcoe County Farmers' Week.* Barrie. Jan.

Schaafsma, A.W., 1990. "The effect of cultural practices on diseases and insects of winter wheat." *S.W. Ont. Farmers' Week.* R.C.A.T. Jan. 4.

Schaafsma, A.W. and Ablett, G.R., 1989. "Developing a decision threshold for potato leafhopper, Empoasca fabae, control in dry beans." *Proc. Internat. Bean Improvement.* Comm. Nov. 9.

Shaw, J.E., 1990. "Problem weeds: new crop protectants." *Proc. S.W. Ont. Farmers' Week* R.C.A.T. Jan. 4.

Shaw, J.E., 1990. "Weed control update." *Proc. S.W. Ont. Farmers' Week.* R.C.A.T. Jan. 3.

Underwood, J., 1990. "Managing low temperature drying systems." Proc. S.W. Ont. Farmers' Week. R.C.A.T. Jan.

Underwood, J., 1990. "Soybean conditioning and storage." *Proc. S.W. Ont. Farmers' Week.* R.C.A.T. Jan.

BOOKS, THESES AND REPORTS

De Schutter, A., 1989. *A comparison of beat-processed full-fat soybeans for starter pigs.* R.C.A.T. Animal Res. Rpt. Pp. 45.

De Schutter, A., 1989. *Optimum dietary lysine for grower/finisher hogs.* R.C.A.T. Animal Res. Rpt. Pp. 36.

De Schutter, A., 1989. *Optimal dilution rates of mouldy corn for market hogs.* R.C.A.T. Animal Res. Rpt. Pp. 42.

De Schutter, A.C., 1989. *Optimum level of full-fat soybeans and crude protein in rations for growing finishing swine based on both growth performance and carcass quality.* R.C.A.T. Animal Res. Rpt. Pp. 25.

De Schutter, A., 1989. *The efficacy of palasweet in the drinking water of weaner pigs.* R.C.A.T. Animal Res. Rpt. Pp. 50.

De Schutter, A. and Osborne, W.R., 1989. *The effect of heat processing method on the feeding value of full-fat soybeans and acceptability of pork.* R.C.A.T. Animal Res. Rpt. Pp. 31.

De Schutter, A., Dinnissen, S., Morris, J. and Osborne, R., 1989. *Effect of inclusion rate of full-fat soybeans and ration crude protein on growth performance and carcass quality of swine.* R.C.A.T. Animal Res. Rpt. Pp. 26.

Dinnissen, S.M., 1989. *Hog and cattle market comments.* Market Update Reports. Issues 151-169.

Dinnissen, S.M., 1990. *Hog and cattle market comments.* Market Update Reports, Issues 170-175.

Doidge, B.R., 1989. *Farm management and marketing research review.* Report of O.M.A.F. Economics and Policy Coordination Branch and Colleges of Agricultural Technology to A.R.I.O., Oct.

Doidge, B.R., 1989. *Futures, cash and basis comments.* Market Update Reports. Issues 151-169.

Doidge, B.R., 1990. *Futures, cash, and basis comments.* Market Update Reports. Issues 170-175.

Doidge, B.R., 1990. *The grain trade in Ontario.* Agricultural Economics and Business Section Publication Ridgetown College, Mar.

Frank, R., Braun, H.E., Ripley, B.D. and Pitblado, R.E., 1989. *Residues of seven insecticides and two fungicides in raw and processed tomatoes.* Research Rpt.

Groenewegen, A., 1989. *Ridgetown College dairy centre.* 1988-1989 R.C.A.T. Animal Research Report. Pp. 60-61.

Jackson, W., 1989. *The R.C.A.T. beef centre.* 1988-1989 R.C.A.T. Animal Research Report. Pp. 56-57.

Lee, F., 1989. *R.C.A.T. swine herd stats and information.* 1988-1989 R.C.A.T. Animal Research Report. Pp. 1.

Loewen, S.A., 1990. *Supersweet sweet corn cultivar trials.* 1989 O.V.G.M.B. Meeting. London. Jan.

Loewen, S.A. and Wright, R.W., 1990. *1989 vegetable trial report.* R.C.A.T. Tech. Rpt. Jan. 24 Pp.

McLaren, A.D., 1989. *Report on field trials of varieties and mixtures.* Ontario Forage Crop Investigations. R.C.A.T. Test Results.

McLaren, A.D., 1989. *1990 report Ontario hybrid corn performance trials.* Ontario Corn Committee. Chatham. Dec.

Morris, J.R., 1989. *Supplemental fat in diets for pigs — effects on growth rate, carcass composition, and economic returns.* 1988-1989 R.C.A.T. Animal Research Report. Pp. 17-20.

Morris, J.R., 1989. *The feeding of sows to a standard.* 1988-1989 R.C.A.T. Animal Research Report. Pp. 13-14.

Osborne, V.R. and Evans, N.M., 1989. *Application of chronobiological techniques to parturition in dairy cattle.* 1988-1989 R.C.A.T. Animal Research Report. Pp. 62-63.

Pitblado, R.E. 1989. *TOM-CAST: the first year — 1989.* R.C.A.T. Tech. Rpt. R.C.A.T. Sept. 38 Pp.

Pitblado, R.E. and Schaafsma, A.W., 1989. *Fungicide and insecticide.* Research Report — 1989. R.C.A.T. Tech. Rpt. Nov. 98 Pp.

Pitblado, R.E. and Sikkema, P.H., 1989. *Vegetable plug-tray research — 1989.* R.C.A.T. Tech. Rpt. R.C.A.T. Dec. 60 Pp.

Pitblado, R.E., Allen, W.R., Hunt, D.W.A., and Shipp, J.L., 1990. *Greenhouse vegetable seedling — protocol for managing thrips and the tomato spotted wilt virus.* 1990-054 O.M.A.F. Factsheet.

Pitblado, R.E., 1990. *R.C.A.T.'s vegetable insect and disease research report.* O.V.G.M.B. Ann. Report. London. Feb. 1.

Sikkema, P.H., 1989. *Plug tomato research results and seed germination evaluations.* Processing Tomato Seedling Plant Growers' Marketing Board Meeting. Leamington. Dec.

Sikkema, P.H., 1990. *Research program: Cedar Springs Research Station 1990.* W.O.F.T.A. Annual Meeting. Ridgetown. Feb.

Sikkema, P.H., 1990. *Sweet corn research results, 1989.* O.V.G.M.B. Meeting. London. Jan.

Smid, A.E., 1989. *Annual report on Co-operative wheat variety trials in Ontario, 1989.* Univ. of Guelph. Guelph. Dec.

Smid, A.E., 1989. *Progress report Canadian winter barley registration trial 1989.* Univ. of Guelph. Guelph. Dec.

Smid, A.E., 1989. *Progress report on barley, oats, winter barley, soft white and hard red winter wheat, winter triticale — Ontario Regional Tests 1989.* Univ. of Guelph. Guelph.

Smid, A.E., 1989. *Progress reports on Eastern Screening and Co-operative two-row and six-row spring barley and oat tests 1989.* Agric. Can. Ottawa Plant Res. Cntr. Rpt. Nos. 200, 201, 203, 204.

Smid, A.E., 1990. *Rate and time of nitrogen, cerone and fungicide on Augusta soft white winter wheat.* Rpt. to Ont. Cereal Crop Comm. Jan.

Smid, A.E. and Teich, A.H., 1990. *Effect of row spacing on soft white winter wheat productivity.* Rpt. to Ont. Cereal Crop Comm. Jan.

Winfield, R.G. and Underwood, J.A., 1989. *Toward more efficient field application of pesticides.* R.C.A.T. Tech. Rpt.

Young, D.S., 1990. *Effect of tillage treatment on corn and soybean yield and selected soil properties in southwestern Ontario.* M.Sc. Thesis, Univ. of Guelph. Guelph. Jan.

UNIVERSITY OF GUELPH — ONTARIO AGRICULTURAL COLLEGE

BEEF

PERIODICALS

Armstrong, S.L. and Wilton, J.W., 1989. "Feed intake, calf weaning weight and ratio of calf weaning weight to cow weight as predictors of net returns." *J. Anim. Sci.* Vol. 67(Suppl. 1). Pp. 37.

Bettger, W.J. and Bray, T.M., 1989. "Effect of dietary zinc or copper deficiency on catalase, glutathione peroxidase and Superoxide dismutase activities in rat heart." *Nutr. Res.* Vol. 9. Pp. 319-326.

Bilanski, W.K. and Mowat, D.N., 1989. "Low-moisture alfalfa leaves as a supplement for alfalfa/grass silage." *Proc. Am. Forage and Grassland Council.* Pp. 352-56.

Bilanski, W.K., Graham, W.D., Mowat, D.N. and Mkomwa, S.S., 1989. "Separation of alfalfa silage into stem and leaf fractions in a horizontal air stream." *Trans. ASAE.* Vol. 32. Pp. 1684-90.

de Rose, E.P. and Wilton, J.W., 1989. "Growth and carcass traits of twin-born versus single-born calves." *J. Anim. Sci.* Suppl. 1. Pp. 75.

Fiss, C.F. and Wilton, J.W., 1989. "Effects of breeding system, cow weight and milk yield on reproductive performance in beef cattle." *J. Anim. Sci.* Vol. 67. Pp. 1714-1721.

Gong, J. and Forsberg, C.W., 1989. "Factors affecting adhesion of Fibrobacter succinogenes subsp. succinogenes S85 and adherence defective mutants to cellulose." *Appl. Environ. Microbiol.* Vol. 55. Pp. 3039-3044.

Gong, J., Lo, R.Y.C. and Forsberg, C.W., 1989. "Molecular cloning and expression in Escherichia coli of a cellodextrinase gene from Bacteroides succinogenes S85." *Appl. Environ. Microbiol.* Vol. 55. Pp. 132-136.

Hickey, G.J., Walton, J.S. and Hansel, W., 1989. "Purification of a luteotrophic protein from bovine allantoic fluid." *Proc. of BARD Workshop on Maternal Recogn. of Pregnancy and Maint. of Corpus Luteum.*

Innocenti, E., Mowat, D.N. and Mandell, I.B., 1989. "Effect of sulphur dioxide and ammonia in chemical composition and in-vitro digestibility of corn stover and barley straw." *Can. J. Anim. Sci.* Vol. 69. Pp. 963-72.

Mandell, I.B., Mowat, D.N., Bilanski, W.K. and Rai, R.N., 1989. "Effect of heat treatment of alfalfa prior to ensiling on nitrogen solubility and in-vitro ammonia production." *J. Dairy Sci.* Vol. 72. Pp. 2046-54.

McGavin, M.J. and Forsberg, C.W., 1989. "Catalytic and substrate-binding domains of endoglucanase 2 from Bacteroides succinogenes." *J. Bacteriol.* Vol. 171. Pp. 3310-3315.

McGavin, M.J., Forsberg, C.W., Crosby, B., Bell, A.W., Dignard, D. and Thomas, D.Y., 1989. "Structure of the cel-3 gene from fibrobacter succinogenes S85 and characteristics of the encoded gene product, endoglucanase 3." *J. Bacteriol.* Vol. 171. Pp. 5587-5595.

Rae, W.A. and Ball, R.O., 1989. "Meat quality: An overlooked genetic trait." ***Breeder and Feeder Magazine***. Fall.

Rajamahendran, R.A., Eide, A., Robinson, J., Taylor, C. and Walton, J.S., 1989. "Effect of norgestomet on follicular dynamics, corpus luteum growth, progesterone, LH, estrus and ovulation in cycling heifers." ASAS/ADSA Lexington, Kentucky, July 31 - Aug 4, J. *Dairy Sci.* Vol. 72. Suppl. 1. Pp. 383.

Ruiz, A., Mowat, D.N. and Grovum, W.L., 1989. "Effects of feeding frequency and soybean meal supplementation of alfalfa silage on duodenal nitrogen supply to sheep." *Can. J. Anim. Sci.* Vol. 69. Pp. 1021-30.

PROCEEDINGS

Acton, K.S. and Bray, T.M., 1989. "The role of prostanoids in the pathogenesis of 3-methylindole induced lung disease." *Proc. Can. Fed. Biol. Soc.* Vol. 31. Pp. 61.

Bilanski, W.K. and Mowat, D.N., 1989. "Low-moisture alfalfa leaves as a supplement for alfalfa/grass silage." *Proc. Am. Forage and Grassland Council Ann. Mtg.*, Guelph, May.

Bruce, H.L. and Ball, R.O., 1989. "Interactions between temperature, pH and structural damage on beef quality." *Can. Soc. Anim. Sci. Ann. Mtg.*

Bruce, H.L. and Ball, R.O., 1989. "Post-mortem interactions of muscle temperature, pH and structural damage on beef quality." *Amer. Soc. Anim. Sci. Ann. Mtg.*

Gong, J. and Forsberg, C.W., 1989. "Factors affecting adhesion of Fibrobacter succinogenes S85 and adhesion defective mutants to cellulose." *Cellulose Workshop*, July 11-13, Nantes, France.

Hammermueller, J.D., Bettger, W.J. and Bray, T.M., 1989. "Effect of dietary Zn deficiency on membrane fluidity in rat lung and liver microsomes: an ESR spin labeling study." *FASEB J.*, 3(3): A651 (Abstr. 2467).

Huang, L. and Forsberg, C.W., 1989. "Cellulose digestion and cellulase regulation and distribution in Fibrobacter succinogenes S85." ***The Twentieth Biennial Conf. on Rumen Function***, Nov. 7-9, Chicago.

Innocenti, E., Mowat, D.N. and Mandell, I.B., 1989. "Effect of sulphur dioxide and ammonia on chemical composition and in-vitro digestibility of corn stover and barley straw." *Proc. Can. Soc. Anim. Sci. Ann. Mtg.* Montreal, Quebec, July.

McGavin, M. and Forsberg, C.W., 1989. "Catalytic and substrate binding domains of endoglucanase 2 from Bacteroides succinogenes." *Proc. Am. Soc. Microbiol.* K-80.

McGavin, M., Forsberg, C.W., Crosby, B., Bell, A.W., Dignard, D. and Thomas, D.Y., 1989. "Identification and structure of the cel-3 gene product (EG3) from B. succinogenes." *Proc. Am. Soc. Microbiol.* K-39.

Mowat, D.N., 1989. "Compensatory gain following moderate protein deprivation of calves." ***Beef Research Update***, Univ. of Guelph, Guelph.

Mowat, D.N. and Buchanan-Smith, J.G., 1989. "Compensatory gain following protein deprivation of calves." ***Beef Res. Update***, Univ. of Guelph, Guelph.

Murch, S.J., Bruce, H.J. and Ball, R.O., 1989. "Rapid separation and identification of muscle proteins by high performance gel permeation chromatography." *Can. Soc. Anim. Sci. Ann. Mtg.*

Wilton, J.W., 1989. "Growth and measurement in total herd efficiency." *Proc. of the Alberta Beef Symposium*, 1989. Alberta Agriculture, Lethbridge, Alta.

BOOKS, THESES, REPORTS

Bruce, H.L., 1989. ***Post-mortem muscle metabolism and meat quality of the bovine carcass.*** M.Sc. (Thesis), Univ. of Guelph, February, 184 pages.

Bruce, H.L. and Ball, R.O., 1989. Beef Research Update, 1988 OAC Publ. No. 0289. ***Design and implementation of an extension model for experimentation on bovine muscle excised postmortem.*** Pp. 37., ***Effect of increased rate of glycolysis on meat quality of excised pre-rigour bovine semitendinosus muscles.*** No. 0289. Pp. 40.

Buchanan-Smith, J.G., 1989. ***Sustainable agriculture and the beef industry.*** Breeder and Feeder, November.

Mandell, I.B., Marshall, S.A., Wilton, J.W., Ball, R.O., and Johnson, W.H., 1989. ***Determining alternative fibre sources for central test station bulls using feed intake recording devices.*** Beef Industry Research Report.

Murch, S.J., Bruce, H.L. and Ball, R.O., 1989. ***Characterization of bovine muscle proteins as a measure of meat tenderness utilizing gel permeation chromotography.*** Beef Research Update, 1988 OAC Publ. No. 0289. Pp. 45.

DAIRY

PERIODICALS

Burton, J.L., Burnside, E.B., Kennedy, B.W., Wilkie, B.N. and Burton, J.H., 1989. *J. Dairy Sci.* Vol. 72. "Antibody responses to human erythrocytes and ovalbumin as marker traits of disease resistance in dairy calves." Pp. 1252-1265. "Dinitrochlorobenzene contact hypersensitivity as a marker trait to improve disease resistance in calves." Pp. 2351-2361. "Variation in serum concentrations of immunoglobulins G, A and M in Canadian Holstein Friesian calves." Pp. 135-149.

Engelhardt, H.E., Walton, J.S., King, G.J. and Miller, R.B., 1989. "Induction of ovarian cysts in cows using estradiol valerate: characterization of ovarian changes and plasma hormone response." *Biol. Reprod.* Vol. 40. Pp. 1287-1297.

Gibson, J.P. and Kennedy, B.W., 1989. "The value of restricted and desired gains selection indexes." *J. Anim. Sci.* Vol. 67. Suppl. 1. Pp. 39.

Halbert, G.W., Leslie, K.E., Walton, J.S. and Betteridge, K.J. 1989. "Evaluation of return to estrus in superovulated dairy heifers following prostaglandin treatment." Int'l. *Embryo Transfer Soc.*, Denver, CO., January.

Javorsky, P., Lee, S.F., Gibbins, A.M. and Forsberg, C.W., 1989. "B-galactosidase activity of Fibrobacter succinogenes." *Proc. of 20th Conf. on Rumen Function*, Nov. 7-9.

Kennedy, B.W., 1989. "Coalescence of molecular and quantitative techniques for genetic improvement." *J. Anim. Sci.* 67 Suppl. Vol. 1. Pp. 62.

Kennedy, B.W. and Schaeffer, L.R., 1989. "Genetic evaluation under an animal model when identical genotypes are represented in the population." *J. Anim. Sci.* Vol. 67. Pp. 1946-1955.

Kennedy, B.W., and van Arendonk, J.A.M., 1989. "Estimation of single gene effects on quantitative characters under selection." *Proc. 40th Anim. Meet. Europ. Assoc. Anim. Prod.* Vol. 1. Pp. 77.

Macleod, G.K., Grieve, D.G. and Lewis, N.J., 1989. "Effect of feeding strategies on performance of lactating dairy cows." *J. Dairy Sci.* Vol. 72 Supp. 1.

McEwen, P.L. and Schaeffer, L.R., 1989. "Comparing mate quality between proven and unproven dairy bulls." *Can. J. Anim. Sci.*, Vol. 69. Pp. 57-60.

Muysson, D.J., Verrinder Gibbins, A.M., Forsberg, C.W. and Krell, P.J., 1989. "Cloning of genes coding for D-xylose utilization in Bacteroides ruminicola." *Proc. Am. Soc. Microbiol.* K-140.

Niezen, J. and Grieve, D.G., 1989. "Rate of growth and mammary development of dairy heifers in two periods prior to puberty." *OAC Publication 1189 Guelph Dairy Res. Rpt.* Pp. 133-36.

Raheja, K.L., Burnside, E.B. and Schaeffer, L.R., 1989. *J. Dairy Sci.* Vol. 72. "Heifer fertility and its relationship with cow fertility and production traits in Holstein dairy cattle." Pp. 2665. "Relationships between fertility and production in Holstein dairy cattle in different lactations." Pp. 2670.

Raheja, K.L., Nadarajah, K. and Burnside, E.B., 1989. "Relationship of bull fertility with daughter fertility and production traits in Holstein dairy cattle." *J. Dairy Sci.* Vol. 72. Pp. 2679.

Rajamahendran, R., Robinson, J., Desbottes, S. and Walton, J.S., 1989. "Relationships among estrus, body temperature, milk yield, progesterone and luteinizing hormone levels and ovulation in post-partum dairy cows." *Theriogenology.* Vol. 31. Pp. 1173-1182.

Rapitta, A.E., Burnside, E.B. and McBride, B.W., 1989. "Dairy production and efficiency of Canadian and New Zealand-sired Holstein heifers." *J. Dairy Sci.* Suppl. 55.

Robinson, N.A., Leslie, K.E. and Walton, J.S., 1989. "Effect of treatment with progesterone on pregnancy rate and plasma concentrations of progesterone in Holstein cows." *J. Dairy Sci.* Vol. 72. Pp. 202-207.

Schaeffer, L.R. and Kennedy, B.W., 1989. "Effects of MOET schemes on genetic evaluation methodology in beef cattle." *J. Anim. Sci.* Vol. 67. Pp. 2536-2543.

Schaeffer, L.R., Kennedy, B.W. and Gibson, J.P., 1989. "The inverse of the gametic relationship matrix." *J. Dairy Sci.* Vol. 72. Pp. 1266-1272.

Southwood, O.I., Kennedy, B.W., Meyer, K. and Gibson, J.P., 1989. "Estimation of additive maternal and cytoplasmic genetic variances in animal models." *J. Dairy Sci.* Vol. 72. Pp. 3006-3012.

Stelwagen, K., McBride, B.W. and Grieve, D.G., 1989. "Nuclear magnetic resonance (NMR) spectroscopy and proton imaging of bovine mammary glands." *J. Dairy Sci.* Vol. 72. Suppl. 1.

Sullivan, P.G. and Schaeffer, L.R., 1989. "Regional heterogeneity of variances and its effect on Canadian holstein sire evaluation." *Can. J. Anim. Sci.* Vol. 69. Pp. 605-612.

van Arendonk, J.A.M., Smith, C. and Kennedy, B.W., 1989. "Method to estimate genotype probabilities at individual loci in farm livestock." *Theor. Appl. Genet.* Vol. 78. Pp. 735-740.

Van Vliet, R.A., Verrinder Gibbins, A.M. and Walton, J.S., 1989. "Livestock embryo sexing: A review of current methods with emphasis on Y-specific DNA probes." *Theriogenology.* Vol. 32. Pp. 421-439.

Van Vliet, R.A., Verrinder Gibbins, A.M., Goodwin, M.L., Betteridge, K.J., Wildeman, A.G. and Walton, J.S., 1989. "Detection of messenger RNA for oxytocin and B-actin in bovine conceptuses on day 18 of gestation." *Soc. for the study of Reproduction*, Columbia, Missouri, August 7-9.

Yadav, M.C., Walton, J.S. and Leslie, K.E., 1989. *The Bovine Practitioner.* Vol. 23. "Reproductive endocrinology of the cow: Part 1, Endocrinology of the estrous cycle.", "Reproductive endocrinology of the cow: Part 2, Superovulation." Pp. 4-19.

PROCEEDINGS

Campbell, N.L., Verrinder Gibbins, A.M. and Ruhnke, H.L., 1989. "Cloning and expression of genes from virulent strains of the bovine pathogen, Ureaplasma diversum." *Am. Soc. for Microb. Ann. Mtg.*, New Orleans, May.

Macleod, G.K., Grieve, D.G. and Lewis, N.J., 1989. "Effect of feeding strategies on performance of lactating dairy cows." Presented at joint meeting of *ADSA and ASAS*, Kentucky, August.

Macleod, G.K., Grieve, D.G. and Lewis, N.J., 1989. "Effect of feeding strategies on performance of lactating dairy cows." *J. Anim. Sci.* Vol. 67. Supp. 1: Pp. 509.

Reiger, D., Walton, J.S. and Coy, D.H., 1989. "The effect of an LH-RH antagonist-induced delay of ovulation on the numbers and quality of embryos collected from superovulated cows." *Meeting of South. Ont. Reproductive Biol.*, Univ. of Guelph, Guelph, April.

Stelwagen, K., McBride, B.W. and Grieve, D.G., 1989. "Nuclear magnetic resonance (NMR) spectroscopy and proton imaging of bovine mammary glands." *J. Anim. Sci.* Vol. 67. Suppl. Pp. 1226 (Abstract).

Stelwagen, K., McBride, B.W. and Grieve, D.G., 1989. "Nuclear magnetic resonance (NMR) spectroscopy and proton imaging of bovine mammary glands." Presented to joint mtg. *ASAS and ADSA* Lexington, Ky. August.

BOOKS, THESES, REPORTS

Burton, J.L., Burnside, E.B., Kennedy, B.W., Wilkie, B.N. and Burton, J.H., 1989. Guelph Dairy Res. Rpt. *Antibody responses to human erythrocytes and ovalbumin as marker traits of disease resistance in dairy calves., Dinitrochlorobenzene contact hypersensitivity as a marker trait for selection to improve disease resistance in calves.* Pp. 91-107.

Campbell, Nancy, 1989. *Cloning and expression of genes from virulent and avirulent strains of the bovine pathogen, Ureaplasma diversum.* M.Sc. (Thesis), University of Guelph, Guelph.

Ganesh, D. and Grieve, D.G., 1989. *Classification of protein into rumen degradable and undegradable fractions for roughages fed to dairy animals in Southwestern Ontario.* Report to Special Projects Committee, OMAF, November, 35 pp.

Kennedy, B.W. and Schaeffer, L.R., 1989. *Genetic evaluation under an animal model when identical genotypes are represented in the population.* Guelph Dairy Res. Rpt. Pp. 26-35.

Macleod, G.K., Grieve, D.G. and Lewis, N.J., 1989. *Feeding strategies and their effects on performance of lactating dairy cows.* OAC Pub. No. 489, Guelph Dairy Research Report. Pp. 127-131.

Moore, A., 1989. *Feeding strategies for dairy cows: The effect of feeding frequency, sequence and the inclusion of low quantities of hay on production, eating behaviour and rumen fermentation.* M.Sc. (Thesis), University of Guelph, Guelph, December.

Moore, R.K., Kennedy, B.W., Schaeffer, L.R. and Moxley, J.E., 1989. Guelph Dairy Res. Rpt. *Parameter estimates for feed intake and production in first lactation using milk recording data., Relationships between reproduction traits, age and body weight at calving and days dry in first lactation Ayrshires and Holsteins.* Pp. 44-55.

Muysson, D.J., 1989. *Cloning of genes coding for D-xylose isomerase in the rumen bacterium Bacteroides ruminicola.* M.Sc. (Thesis), University of Guelph, Guelph.

Nadarajah, K., Burnside, E.B. and Schaeffer, L.R., 1989. *Relationship among gestation length, calving ease and calf mortality in Holstein cattle.* Guelph Dairy Research Report.

Rajamahendran, R. and Walton, J.S., 1989. *Follicular development and corpus luteum formation in post partum dairy cows.* Guelph Dairy Research Report. Pp. 239-244.

Schaeffer, L.R. and Kennedy, B.W., 1989. *The inverse of the gametic relationship matrix.* Guelph Dairy Res. Rpt. Pp. 82-85.

Southwood, O.I., Kennedy, B.W., Meyer, K. and Gibson, J.P., 1989. *Estimation of additive maternal and cytoplasmic genetic variances under animal models.* Guelph Dairy Research Report. Pp. 86-90.

Walton, J.S., Halbert, G.W., Robinson, N.A. and Leslie, K.E.,1989. *Effects of progesterone and human chorionic gonadotrophin administration five days post insemination on plasma and milk concentrations of progesterone and pregnancy rates of normal.* Guelph Dairy Research Report. Pp. 173-179.

SWINE

PERIODICALS

Evans, F.D., Evans, N.M., Hacker, R.R. and Peters, M., 1989. "Delivery pattern required for a long term pST implant to favourably influence pig performance." *AAA of Animal Production* (In Press).

Hahn, E., Hacker, R.R. and Bayle, H.S., 1989. "Exercise and fuel metabolism in the young growing pig: Effect on tissue protein, plasma fuels and growth hormone." *Faseb J.* Vol. 3. Pp. 449.

Hurnik, J.F., 1989. "Electronic nursing device for young piglets (Robotic Sow)." *Ont. Swine Res. Review.* Pp. 5-8.

Kennedy, B.W., 1989. "Estimated Breeding Values. A guide through the jungle of selection." *Ontario Hog Farmer,* Winter.

Kennedy, B.W. and Van Diepen, T.A., 1989. "Test station picks pass muster." *Hog Market Place Quarterly,* Spring. Pp. 65-66.

Keys, J.L. and King, G.J., 1989. "Structural changes in the luminal epithelium of the porcine uterus between days 10 and 19 of the estrous cycle." *Am. J. Anat.* Vol. 185. Pp. 45-57.

Keys, J.L, King, G.J. and LaForest, J.P., 1989. "Autofluorescence of the porcine endometrium during early pregnancy." *Biol. Reprod.* Vol. 40. Pp. 220-222.

King, G.K. and Wathes, D.C., 1989. "Relaxin, progesterone and estrogen in sow plasma during natural and induced parturitions." *Anim. Reprod. Sci.* Vol. 20. Pp. 213-220.

Morrison, W.D., Braithwaite, L.A., Otten, L., McMillan, I. and Pei, D.C.T., 1989. "A microwave-heated weaner deck — preliminary study." *Ann. Mtg.* — Amer. Soc. An. Sci.

Morrison, W.D., LaForest, K.L. and McMillan, I., 1989. "Effect of group size on operant heat demand of piglets." *Can. J. Anim. Sci.* Vol. 69. Pp. 23-26.

Morrison, W.D., LaForest, K.L., McMillan, I., Otten, L. and Pei, D.C.T., 1989. "Growth and reproductive performance of gilts raised under supplementary infrared or microwave heat." *Can J. Anim. Sci.* Vol. 69. Pp. 27-31.

Riley, D. and Bayley, H.S., 1989. "Exercise, stress and food intake regulation in the young pig." *Cdn. Fed. of Biol. Sc.* (1989) Proc. Pp. 58.

Southwood, O.I. and Kennedy, B.W., 1989. "Estimates of direct and maternal additive genetic variance for litter size in swine under an animal model." *J. Anim. Sci.* Vol. 67. Suppl. 1. Pp. 69.

Squires, E.J., 1989. "Involvement of cytochrome P-450 in the synthesis of 5, 16, androstadien-3B-ol from pregnenolone in pig testes microsomes." *J. Steroid Biochem.* Vol. 33. Pp. 621-626.

Van Diepen, T.A. and Kennedy, B.W., 1989. "Genetic correlations between test station and on-farm performance for growth rate and backfat in pigs." *J. Anim. Sci.* Vol. 67. Pp. 1425-1431.

Van Diepen, T.A. and Kennedy, B.W., 1989. "Genetic correlations between test station and on-farm performance for growth rate and backfat in pigs." *Ont. Swine Res. Rev.* Pp. 36-38.

Wathes, D.C., King, G.J., Porter, D.G. and Wathes, C.M., 1989. "Relationship between pre-partum relaxin concentrations and farrowing interval in the pig." *J. Reprod. Fert.* Vol. 87. Pp. 383-390.

PROCEEDINGS

Ball, R.O., 1989. "Effect of stress at slaughter on brain neurotransmitters in market pigs." *Ont. Swine Res. Review,* 1988, OAC Publ. No. 06/89. Pp. 77.

Ball, R.O. and Laycock, S.R., 1989. "Relationships between stress, brain neurotransmitters and dietary tryptophan in poultry and swine." *25th Ann. Guelph Nut. Conf.*

Ball, R.O. and O'Brien, P.J., 1989. "Hypothalamic neurotransmitters in Yorkshire vs. stress susceptible (Pietrain x Poland China) swine." *Ontario Swine Res. Rev.*, 1988, OAC Publ. No. 06/89. Pp. 75.

Ball, R.O., Lawson, S.L. and Moore, H., 1989. "Effect of dietary tryptophan concentration and feeding period on serotonin concentration in hypothalamus of market pigs." *Ont. Swine Research Review,* 1988, OAC Publ. No. 06/89. Pp. 79.

Kennedy, B.W., 1989. *Proc. Nat. Swine Impr. Fed.* Vol. 14 "Concepts and misconceptions on the use of estimated breeding values." 5 Pp. "Using the animal model to estimate breeding values for sow productivity traits." 7 Pp.

Kennedy, B.W., 1989. "Swine production genetics." *Soc. Ont. Vet. Scient.* Conf. Proc. 8 Pp.

Mittal, G.S., Lin, C.W. and Barbut, S., 1989. "Role of various processes in reduced salt restructured ham." *35th Inter. Cong. of Meat Sci.*, Copenhagen, Denmark.

Morrison, W.D., Smith, J.H., McMillan, I., Ogilvie, J.R., Kains, F. and Hacker, R.R., 1989. "Effect of ventilation rates on air-borne dust in a hog growing-finishing unit." *Ann. Mtg. Midwest Amer.* Soc. An. Sci.

Morrison, W.D., Butera, M., Smith, J., McMillan, I., Kains, F., Ogilvie, J.R. and Hacker, R.R., 1989. "Influence of certain environmental factors on bioaerosols in a hog growing-finishing unit." *Ann. Mtg. Midwest Amer. Soc. An. Sci.*

van Arendonk, J.A.M. and Kennedy, B.W., 1989. "Efficiency of selection strategies for the halothane gene." *Proc. 40th Ann. Mtg. Europ. Assoc. Anim. Prod.* Vol. 1. Pp. 73.

BOOKS, THESES, REPORTS

Darko, E.A., 1989. *Fat utilization in diets for early weaned pigs.* M.Sc.(Thesis), University of Guelph, Guelph.

Morrison, W.D., Hacker, R.R., Kains, F. and Ogilvie, J.R., 1989. *Response of air-borne dust and gases in a growing-finishing barn, to three ventilation rates.* Report for Centralia Research Update.

Squires, E.J., 1989. *Boars now Taint tested.* Hog Marketplace Quarterly, Fall.

Squires, E.J., 1989. *Detection and Control of Taint in Boar Carcasses.* Highlights, Dec. Pp. 18-20.

POULTRY

PERIODICALS

Atteh, J.O., Leeson, S. and Summers, J.D., 1989. "Effects of dietary sources and levels of fat on laying hens fed two levels of calcium." *Nutr. Rep. Int.* Vol. 40. Pp. 451-464.

Atteh, J.O., Leeson, S. and Summers, J.D., 1989. "Effects of dietary sources and levels of fat on performance, nutrient retention and bone mineralization of broiler chicks fed two levels of calcium." *Can. J. Anim.* Sci. Vol. 69. Pp. 459-467.

Barbut, S., 1989. "The effect of three chloride salts and chopping time in the microstructure and texture of meat batters." *Can. Food Sci.* Technol. Vol. 22. Pp. 284.

Barbut, S., and Mittal, G.S., 1989. "Effect of salt reduction on the rheological and gelatin properties of beef, pork and poultry meat batters." *Meat Sci.* Vol. 26. Pp. 52.

Barbut, S. and Mittal, G.S., 1989. "Influence of K+ and Ca++ on the rheol .gical and gelatin properties of reduced fat pork sausages containing carrageenans." *Food Sci. Technol.* Vol. 23(3). Pp. 124.

Bennett, C.D. and Leeson, S., 1989. *Poultry Science.* Vol. 68. "Growth of broiler breeder pullets with skip-a-day versus daily feeding." Pp. 836-838. "Water usage of broiler breeders." Pp. 617-621.

Brazolot, C.L., Petitte, J.N., Etches, R.J. and Gibbins Verrinder, A.M., 1989. "The establishment of efficient gene transfer and expression in chicken embryonic stem cells." *Cell Differentiation and Development.* Vol. 27. Suppl. 1. S90.

Etches, R.J., Petitte, J.N. and Clark, M.E., 1989. "Chickens with four parents-Part II." *Canada Poultryman.* Vol. 76. Pp. 30.

Etches, R.J., Petitte, J.N., Verrinder Gibbins, A.M., Brazolot, C.L. and Liu, G., 1989. "Production of chimeric chicks by embryonic cell transfer and the prospects for gene manipulation." *Avian Incubation and Embryology* 22nd British Poultry Science Symposium.

Leeson, S., 1989. *Canada Poultryman.* Vol. 76. "Broiler growth patterns (I)." Pp. 6-8. "Manipulating body composition." Pp. 25-26.

Leeson, S., 1989. "Implications of differential growth patterns of broiler chickens." *Nutrition Update.* Vol. 7. Pp. 2.

Leeson, S., 1989. "Niacin in poultry nutrition." *Lonza Technical Bull.*, Basel, Switzerland.

Leeson, S., 1989. "Water softeners and salt toxicity." *Canada Poultryman*, March. Pp. 7.

Leeson, S. and Summers, J.D., 1989. "Performance of leghorn pullets and laying hens in relation to hatching egg size." *Can. J. Anim.* Sci. Vol. 69. Pp. 449-458.

Leeson, S. and Summers, J.D., 1989. "Response of leghorn pullets to protein and energy in the diet when reared in regular or hot-cyclic environments." *Poultry Sci.* Vol. 68. Pp. 546-557.

Leeson, S., Caston, L.J. and Summers, J.D., 1989. "Comparison of feed allocation systems in broiler nutrition studies." *Nutr. Rep. International.* Vol. 39. Pp. 617-626.

Leeson, S., Caston, L.J. and Summers, J.D., 1989. "The effect of ,·aded levels of nicarbazin on reproductive performance of laying hens." *Can. J. Anim. Sci.* Vol. 69. Pp. 757-764.

McDonald-Jones, P.G.A., Etches, R.J. and Petitte, J.N., 1989. "The development of monoclonal antibodies against bovine and turkey luteinizing hormone." *17th Southern Ontario Reproductive Biology Workshop*, April 28.

Otten, L., Morrison, W.D., Braithwaite, L.A. and Smith, J.H., 1989. "Development of cooled roosts for heat-stressed poultry." *ASAE/CSAE* Quebec.

Petitte, J.N., Etches, R.J. and Clark, M.E., 1989. "Evidence of germline chimerism after transfer of early embryonic stem cells in the chick." *Poultry Science.* Vol. 67. Suppl. 1. Pp. 112.

Petitte, J.N., Liu, G., Verrinder Gibbins, A.M. and Etches, R.J., 1989. "Germline chimeras can be produced by embryonic stem cell transfer in the chicken." *Cell Differentiation and Development.* Vol. 27. Suppl. 1, S89.

Summers, J.D. and Leeson, S., 1989. "The effect of dietary protein and energy intake on egg production and egg weight of egg production type pullets." *Nutr.* Rep. Int. Vol. 40. Pp. 645-652.

Verrinder Gibbins, A.M., 1989. "Manipulation of avian genomes." *XVIth Int. Cong. Genetics*, Toronto, Aug/88, Genome Vol. 31. Pp. 456-457.

PROCEEDINGS

Braithwaite, L.A., Morrison, W.D. and McMillan, I., 1989. "Effect of exposure to 2.45-GHz microwave radiation during incubation on chicken egg weight loss and water vapour conductance." *World Poultry Science Meeting*, Scotland.

Brazolot, C.L. and Verrinder Gibbins, A.M., 1989. "Gene manipulation in poultry." *Cdn. Animal Genetics Workshop*, Montreal, Quebec, July.

Brazolot, C.L., Petitte, J.N., Etches, R.J. and Verrinder Gibbins, A.M., 1989. "The establishment of efficient gene transfer and expresion in chicken embryonic stem cells." *11th Int'l. Congress of the Int'l Society of Developmental Biologists*, Utrecht, The.

Brazolot, C.L., Petitte, J.N., Liu, G., Etches, R.J. and Verrinder Gibbins, A.M., 1989. "Efficient transfection of chicken blastodermal cells by lipofection, and introduction of transfected cells into the embryo." *Alberta Heritage Foundation for Medical Research Conference*, Calgary, Alta, November.

Brazolot, C.L., Petitte, J.N., Liu, G., Etches, R.J. and Verrinder Gibbins, A.M., 1989. "Efficient transfection of chicken blastodermal cells by lipofection and introduction of transfected cells into the embryo." *Proceedings of the Cdn. Society of Cell Biology Annual Meeting*, November.

Gibbins, A.M., 1989. "The value of transgenic animals to medicine, agriculture and biology." *Int. Conf. Science Teaching, Canada's Future (STAO/APSQ, CASE/UNESCO)* Ottawa, October.

Gibbins, A.M., 1989. "Transgenic Poultry." *UCLA Symposium: Transgenic Models in Medicine and Agriculture*, Taos, N.M.

Gordon, A. and Barbut, S., 1989. "The effect of five chloride salts on the stability, texture and microstructure of poultry batters." *42nd Annual Reciprocal Meat Conference*, Guelph.

Jones, M.E., Liu, G., Verrinder Gibbons, A.M. and Mench, J.A., 1989. "DNA fingerprinting analysis of behavioural correlates of male mating success in chickens." *Poultry Science Association Annual Meeting* University of Wisconsin, Madison, Wisc., July.

Leeson, S., 1989. *MSD Agvet Annual Poultry Seminar Flamingo Bay*, Costa Rica, November 11th. "Bird response to feed textures." "Current ideas in broiler nutrition."

Leeson, S., 1989. "Feeding broilers for reduced maintenance requirement." *Maryland Nutrition Conference*, Baltimore, Maryland, March 16-17.

Leeson, S., 1989. "Feeding for egg production." *American Feed Industry Association Ann. Mtg.* Kansas City, Mo., May 7-10.

Leeson, S., 1989. "Feeding for egg production vs. egg size." *Craig Hunter Seminar, Trenton.*

Leeson, S., 1989. "Feeding for egg production vs. egg size." Woodstock, Sept. 14.

Leeson, S., 1989. "Feeding programs for layers." Feed Industry meeting, Winnipeg, Manitoba, April 10.

Leeson, S., 1989. "Life-cycle nutrition of leghorn birds." *3rd Annual Ralston Purina Int'l. S.A.B. meeting*, Maui, Hawaii, June 26-July 1st.

Leeson, S., 1989. "Research at the University of Guelph." *Annual Meeting, Ont. Hatcheries Assoc.*, Hamilton, November 1.

Miles, S. and Leeson, S., 1989. "Restricted feeding of turkey breeders." *P.S.A. Annual meeting*, Wisconsin, U.S.A., July 25-28.

Petitte, J.N., Etches, R.J. and Clark, M.E., 1989. "The production of germ-line chimeras by embryonic cell transfer." *17th Annual Southern Ontario Reproductive Biology Workshop*, April 28.

Petitte, J.N., Liu, G., Verrinder Gibbins, A.M. and Etches, R.J., 1989. "Germline chimeras can be produced by embryonic stem cell transfer in the chicken." *11th Int'l. Congress of the Int'l Society of Developmental Biologists*, Utrecht, The.

Valdes, E. and Leeson, S., 1989. "Near-infra red reflectance spectroscopy for measurement of diet metabolizable energy." *World Congress NIRA*, Tokyo, Japan, May 20-26.

BOOKS, THESES, REPORTS

Barbut, S. and Findlay, C.J., 1989. *Sodium reduction in poultry products — A review.* RC Crit. Rev. in Poultry Biology. Vol. 2. Pp. 59.

Leeson, S., 1989. *Broiler meat quality.* CKLM TV, Nov. 29th.

Leeson, S., 1989. *Salmonella in broiler production.* CKCO TV Interview, July 4th.

ENGINEERING

PERIODICALS

Bicho, P.A., Cunningham, J.D. and Lee, H., 1989. "Differential fructose effect in Pachysolen tannophilus and Pichia stipitis." *FEMS Microbiology Letters.* Vol. 57. Pp. 323-327.

Bilanski, W.K., Graham, W.D., Mowat, D.N. and Mkomwa, S.S., 1989. "Separation of alfalfa silage into stem and leaf fractions in a horizontal airstream." *Trans. ASAE.* Vol. 32(6).

Jofriet, J.C., Zhao, Q., Darby, D.E. and Bellman, H., 1989. "Bunker silo wall loads." *Can. Agric. Engng.* Vol. 31(2). Pp. 187-193.

Mandell, I.R., Mowat, D.N., Bilanski, W.K. and Ral, S.N., 1989. "The effect of heat processing prior to ensiling on nitrogen solubility and in-vitro degradation." *J. Dairy Sci.* Vol. 72. Pp. 2046-2054.

PROCEEDINGS

Bicho, P.A., Cunningham, J.D. and Lee, H., 1989. "Differential fructose effect in Pachysolen tannophilus and Pichia stipitis." *7th Canadian Bioenergy R & D Seminar* Abstract No. P3.1, Ottawa.

Bilanski, W.K. and Mowat, D.N., 1989. "Low-moisture alfalfa leaves as a supplement for alfalfa/grass silage." *Proc. 1989 Forage and Grassland Conf.*, Guelph, May 22-25. Pp. 352-355.

House, H.K., Jofriet, J.C. and Otten, L., 1989. "Moisture distribution and thermal behaviour of sprayed-on polyurethane insulation in high humidity." *ASAE/CSAE 1989 Meeting*, Quebec City, Quebec, Paper No. 89-4030.

Jiang, S., Jofriet, J.C. and Meiering, A.G., 1989. "Breathing of oxygen limiting tower silos." *Transactions of the ASAE.*

Jofriet, J.C., 1989. "Advances in silo research and design in Canada." *1989 Annual Convention, Int'l. Silo Assoc.* Ft. Myers, Florida.

Lee, H. and Fisher, B.G., 1989. "Enrichment of D-fructose by the pentose-fermenting yeast Pichia stipitis." *Canadian Society of Microbiologists'* meeting Abstract No. AM18P, Laval, Quebec.

Lee, H. and Fisher, B.G., 1989. "On the unusual fructose utilization by Pichia stipitis and its potential application." *Society for Industrial Microbiology mtg.* Abstract No. P-33, Seattle, Washington.

Meiering, A.G., 1989. "Leakage testing of sealed silos." *One on One Technical Exhibit at the ASAE Summer Meeting*, Quebec City, Quebec.

Zhao, Q., Jofriet, J.C., Darby, D.E. and Bellman, H., 1989. "Bunker silo wall loads by finite element method." *ASAE/CSAE Meeting*, Quebec City, Quebec, Paper No. 89-4010.

Zhao, Q., Jofriet, J.C., Darby, D.E. and Bellman, H., 1989. "Structural loads on horizontal silo walls." *NAR-ASAE Annual Meeting*, Ithaca, New York, Paper No. NAR 89-111.

BOOKS, THESES, REPORTS

Negi, S.C., 1989. *Densities, pressures and capacities of barley silage in farm tower silos.* Progress report to OMAF, Guelph Ag. Centre Guelph.

Quah, S. and Negi, S.C., 1989. JOINT: *User's manual for design of nailed joints.* School of Engineering, University of Guelph, Guelph.

CORN

PERIODICALS

Corke, H. and Kannenberg, L.W., 1989. "Effect of selection for vegetative phase and actual filling period duration in short-season corn populations." *Crop Sci.* Vol. 29. Pp. 607-612.

Dwyer, L.M. and Tollenaar, M., 1989. "Genetic improvement in photosynthetic response of hybrid maize cultivars, 1959 to 1988." *Can. J. Plant Sci.* Vol. 69. Pp. 81-91.

Stone, J.A., Vyn, T.J., Martin, H.D. and Groenevelt, P.H., 1989. "Ridge tillage and early season soil moisture and temperature on a poorly drained soil." *Can. J. Soil Sci.* Vol. 69. Pp. 181-186.

Tollenaar, M., 1989. "Genetic improvement in grain yield of commercial maize hybrids grown in Ontario from 1959 to 1988." *Crop Sci.* Vol. 29. Pp. 1365-1371.

Vyn, T.J. and Stewart, G.A., 1990. "Compaction research update." Proc. *OAC Ag. Days*, Guelph, Jan., 4 pp.

PROCEEDINGS

Afele, J. and Kannenberg, L.W., 1989. "Corn anther culture: inheritance of culturability." *Gordon research conference on cell and tissue culture.* June (poster).

Afele, J. and Kannenberg, L.W., 1989. "Corn anther culture: inheritance of culturability." *Conference on Genetic Engineering of Monocots* September, University of Guelph, Guelph, (poster).

Kannenberg, L.W., 1989. "A revision to HOPE, the Hierarchical, Open-Ended System for Maize: An Update." *Science for Plant Breeding*, XII Eucarpia Congress, February, Gottingen.

Vyn, T.J., 1989. "Cover crop management" *Proc. OAC Ag. Days*, 6 pp.

Vyn, T.J., 1989. "Preserving grain quality with new management systems." *Proc. Industry Information Updates RCAT and Guelph*, Jan., 4 pp.

Vyn, T.J., 1989. "Specialty corn markets in Ontario." *Proc. Southwestern Ont. Farmer's Week RCAT*, Jan., 3 pp. D:1-5.

BOOKS, THESES, REPORTS

Kannenberg, L.W., 1989. *1990 Report Ontario Hybrid Corn Performance Trials.* Ontario Corn Committee.

McKillop, G.J., 1989. *Mass selection for early flowering in EMS treated and untreated inbred lines of corn (Zea mays L.).* M.Sc. (Thesis), University of Guelph, Guelph, 63 pp.

O'Donnell, N. and Vyn, T.J., 1989. *Producing and assessing high quality corn for the Canadian snack food industry.* Departmental Publication, 20 pp.

Stewart, G.A., 1989. *Wheel traffic and tillage effects on soil structure and corn productivity.* M.Sc. (Thesis), University of Guelph, Guelph, July.

CEREALS

PERIODICALS

Cho, U.H. & Kasha, K.J., 1989. "Ethylene production and embryogenesis from anther cultures of barley (Hordeum vulgare)." *Plant Cell Reports*. Vol. 8. Pp. 415-417.

Falk, D.E., 1989. "Barley, oats, soft white and hard red winter wheat and winter triticale." *Progress Report*, Ontario Regional Tests, 102 pp.

Gamble, E.E. and Peppard, M.H., 1989. *1989 Annual Report*, Crop Science Dept., University of Guelph. "Potential yield enhancement of spring barley and oats.", "The effect of rate of seeding on yield performance in barley." Pp. 67-70.

Kasha, K.J., 1989. "Haploid production in barley and wheat." *Proc. 1987 Symp. on Application of Biotechnology in Agriculture*. Shanghai Sci. & Tech.

Kasha, K.J., 1989. "Production of haploids in cereals." *Proc. 1986 FAO/IAEA Workshop*, "Current Options for Cereal Improvement", Ed. M.

Polsoni, L. and Falk, D.E., 1989. "Oat anther culture." *Biotech IV Quaker*, Nov. 9-11, Chicago, Ill.

Xu, J., Procunier, J.D. and Kasha, K.J., 1989. "Ribosomal RNA gene expression in a tetraploid Hordeum bulbosum clone using biotin labelled in situ hybridization." *Barley Genetics Newsletter*, 19.

Ziauddin, A. and Kasha, K.J, 1989. "Genetic stability of haploid cellcultures." *Biotech. in Agric. & Forestry*. Vol. 12, Ed. Y.P.S. Bajaj, Springer-Verlag.

PROCEEDINGS

Falk, D.E., Polsoni, L., Bridger, G., Louter, J. and Boyd, P., 1989. "A HOPE system for barley." *CSA Annual Meeting*, July, Montreal, Quebec.

Gamble, E.E. and Peppard, M.H., 1989. "The effect of Cerone on lodging and yield performance in barley." *1989 Annual Report*, Dept. of Crop Science, University of Guelph, Guelph. Pp. 65-66.

BOOKS, THESES, REPORTS

Falk, D.E., 1989. Progress Report, Ontario Regional Tests, 102 pp. *Barley, oats, winter barley, soft white and hard red winter wheat., Barley, oats, winter barley, soft white and hard red winter wheat and winter triticale.*

Falk, D.E., 1989. *New cultivars of spring cereals*. OAC Ag. Days.

Falk, D.E., 1989. *Progress Report, barley, oats, winter barley, soft white and hard red winter wheat*. Winter Barley Registration Trials. Pp. 23.

Gamble, E.E. and Peppard, M.H., 1989. 1989 Annual Report, Crop Science Dept., University of Guelph, Guelph. *Response of oat varieties to plant growth regulator treatment., Seed moisture content at planting of spring barley*. Pp. 71-73.

FORAGES

PERIODICALS

Senaratna, T. and McKersie, B.D., 1989. "Artificial seeds for germplasm preservation, exchange and crop improvement." *Diversity*. Vol. 5. Pp. 44.

Senaratna, T., McKersie, B.D. and Bowley, S.R., 1989. "Dessication tolerance in alfalfa somatic embryos. Influence of ABA, stress pretreatments and drying rates." *Plant Science* 1989. Vol. 65. Pp. 253-259.

PROCEEDINGS

Bowley, S.R., Woods, D. and Clarkson, D., 1989. "Proteolytic activity of alfalfa and red clover." *Proc. 1989 Amer. Forage Grassland Conf.*, Guelph. Pp. 287-291.

Gamble, E.E. and Martin Mares, V.M., 1989. "Perennial ryegrass seed crop response to palcobutrazol, nitrogen, and ptopiconazole." *Agronomy Abstracts*, 1989 Ann. Mtg., Am. Soc. of Agronomy, Madison, WI. Pp. 150.

Ratna, T. and McKersie, B.D., 1989. "Dessicated somatic embryos as artificial seeds." *Intern. Worksbop on seeds*. Williamsburg, Virginia.

Senaratna, T. and McKersie, B.D., 1989. "Dessication of somatic embryos for artificial seeds." *Biotechnology Worksbop. Ag. Canada Res. Ctr.*, Ottawa.

Senaratna, T., McKersie, B.D. and Brown, D.C.W., 1989. "Artificial seeds: dessicated somatic embryos." *Tissue Culture Assoc.*, Orlando, Florida.

Senaratna, T., McKersie, B.D. and Ecclestone, S., 1989. "Germination process of artificial seeds (dessicated somatic embryos)." *Can./Amer. Soc. Plant Physiol.*, Toronto.

BOOKS, THESES, REPORTS

Bowley, S.R. and Hancock, D., 1989. *Summary of alfalfa cultivars currently under test*. Ontario Forage Crops Committee.

Gamble, E.E. and Peppard, M.H., 1989. 1989 Ann. Rpt., Crop Sci. Dept., Univ. of Guelph, Guelph. *Establisbment of two cultivars of perennial ryegrass at four rates of seeding using barley as a companion crop., Evaluation of thirteen perennial ryegrass cultivars for seed production*. Pp. 133-136.

Yu, K.F., 1989. *In vitro selection for Verticillium Resistance in Alfalfa*. M.Sc. (Thesis).

PULSES AND OTHER CROPS

PERIODICALS

Ablett, G.A., Beversdorf, W.D. and Dirks, V.A., 1989. "Performance and stability of indeterminate and determinate Soybean in Short Season Environment." *Crop Science*. Vol. 29. Pp. 1428-1433.

Beversdorf, W.D., 1989. "Changes in Crop Research Directions." *Ontario Corn Producer*. Pp. 6-7.

Davies, F.M. and Gamble, E.E., 1989. "Seed vigor in white bean." *Agronomy abstracts, Am. Soc. of Agronomy/Cr. Science Soc. of Am.* Madison, WI. Pp. 149.

Rennie, B.D. and Tanner, J.W., 1989. *Soybean Genetics Newsletter*. Vol. 16. "A new allele at the Fan locus in soybean line A5." "Genetic analysis of low linolenic acid levels in the line PI 123440.", "Mapping a second fatty acid locus to soybean linkage group 17." Pp. 23-28.

Rennie, B.D. and Tanner, J.W., 1989. "Mapping a second fatty acid locus to soybean linkage group 17." *Crop Sci.* Vol., 29. Pp. 1081-1083.

Saindon, G., Beversdorf, W.D. and Voldeng, H.D., 1989. "Adjustment of the Soybean Phenology Using the E4 Locus." *Crop Science* Vol. 29. Pp. 1361-1365.

Saindon, G., Voldeng, H.D., Beversdorf, W.D. and Buzzell, R.I., 1989. "Adjustment of the Soybean Phenology using the E4 Locus." *Crop Science.* Vol. 29. Pp. 1361-1365.

Saindon, G., Voldeng, H.D., Beversdorf, W.D. and Buzzell, R.I., 1989. "Genetic Control of Long Daylength Response in Soybean." *Crop Science.* Vol. 29. Pp. 1436-1439.

Vigier, B., Chiang, M.S. and Hume, D.J., 1989. "Source of resistance to clubroot (Plasmodiophora brassicae Wor.) in trizine-resistant spring canola (rapeseed)." *Can. Plant Disease Survey.* Vol. 6. Pp. 113-115.

PROCEEDINGS

Blair, D.H., Ravuri, V. and Hume, D.J., 1989. "Evaluation of Rhizobium fredii strains HH 003, HH 103 and HH 303 as inoculants for Ontario soybean (Glycine max. L. Merill) production." *Presented to Can. Soc. Agron. Ann. Mtg.*, Montreal, Quebec, Abstracts, Pp.1.

Feindel, D.E. and Hume, D.J., 1989. "Soybean N2 fixation and residual N available to subsequent crops." *Presented to Can. Soc. Agron. Ann. Mtg.*, Montreal, Quebec, Abstracts, Pp. 1.

Hume, D.J. and Blair, D.H., 1989. "Effects of seed-applied fungicides on nodulation and N2 fixation in new soybean fields." *Presented to 12th N. Am. Symbiotic Nitrogen Fixation Conf.*, Ames, Iowa (Poster).

Hume, D.J., Feindel, D.E. and Ravuri, V., 1989. "Performance of Bradyrhizobium japonicum strain 532C in new soybean fields in Ontario." *Paper presented to Can. Soc. Agron. Ann. Mtg.* Montreal, Quebec. Abstracts. Pp. 1.

Hume, D.J., Feindel, D.E., Winter, J.P., Blair, D.H. and Pararajesingham, S., 1989. "Assimilate partitioning in soybean." A.J. Pascale (ed.) *World Soybean Research Conf. IV Proceedings*, Buenos Aires.

Michaels, T.E. and Tinker, N.A., 1989. "Heritability of architecture and agronomic parameters in white bean." *BIC Conference*, Toronto.

Ravuri, V. and Hume, D.J., 1989. "Performance of early-maturing soybeans with strains of B. japonicum and R. fredii" *Paper presented to 12th North Am. Symbiotic Nitrogen Fixation Conf.*, Ames, Iowa.

Tinker, N.A. and Michaels, T.E., 1989. "Effect of cultivar planting pattern, and harvest method on white bean production." *BIC Conference*, Toronto.

Zablotowicz, R.M., Kloepper, J.W., Covert, D.C., Tipping, E.M., Lifshitz, R., Klubeck, B., Varsa, E., Hume, D.J., Ijzerman, M.M. and Hagedorn, C., 1989. "Nodulation enhancement of legumes by plant growth-promoting rhizobacteria." *Paper presented to 12th N. Am. Symbiotic Nitrogen Fixation Conf.*, Ames, Iowa.

BOOKS, THESES, REPORTS

Blair, D.H., 1989. *Evaluation of Rhizobium fredii strains in inoculants for Ontario soybean (Glycine max L. Merill) production.* M.Sc. (Thesis), University of Guelph, Guelph, January.

Brine, R.P., 1989. *Evaluation of seed vigor in rapeseed and the effect of seed vigor on yield components.* M.Sc. (Thesis), University of Guelph, Guelph.

Brine, R.P. and Gamble, E.E., 1989. *Evaluation of seed vigor in rapeseed and the effect of seed vigor on yield and yield components.* 1989 Annual Report, Crop Science Department, University of Guelph, Guelph. Pp. 174.

Feindel, D.E., 1989. *Soybean N2 fixation and residual N available to subsequent crops.* M.Sc. (Thesis), University of Guelph, Guelph, August.

Kott, L.S., Erickson, L.R. and Beversdorf, W.D., 1989. *The role of Biotechnology in Canola/Rapeseed research in Rapeseed/Canola: Production, Chemistry, Nutrition and Processing Technology.* Book, edited by F. Shahidi. Publishers: Van Nostrand.

Rennie, B.D., Thorpe, M.L. and Beversdorf, W.D., 1989. *A procedural manual for the Detection and Identification of Soybean (Glycine max. (L.)) Merr. Isozymes using the Starch Gell Electrophoretic System.* OAC Publication 8901, 54 pp.

Tinker, N.A., 1989. *Agronomy and Heritability of Architectural traits in Phaseolus vulgaris L.* M.Sc. (Thesis), University of Guelph, Guelph.

Zetina, E.V., 1989. *Field performance response to seed vigor of white bean.* M.Sc. (Thesis), University of Guelph, Guelph.

Zetina, E.V. and Gamble, E.E., 1989. *Field performance response to seed vigor of white bean.* 1989 Annual Report, Crop Science Department, University of Guelph, Guelph. Pp. 181-182.

VEGETABLES

PERIODICALS

Barichello, V., Stanley, D.W., Yada, R.Y. and Coffin, R.H., 1989. "Possible influence of starch granule composition on low temperature sweetening." *Abstract Can. Inst. Food Sci. Technol.* J. Vol. 22. Pp. 413.

Barichello, V., Yada, R.Y., Coffin, R.H. and Stanley, D.W., 1989. "Low temperature sweetening in susceptible and resistant potatoes. II. Potato starch structure and composition." *Horticulture Council Report 1989.*

Coffin, R.H., 1989. "New Potato Varieties and Improved Production Techniques" *Invited speaker to Ohio Potato Producers Annual Meeting.*

Coffin, R.H., 1989. "Potato Chip Research in Ontario" *Invited speaker at Potato Chip Colloquin in Quebec.*

Coffin, R.H., Chase, R., Thompson, N., Johnston, G., McKeown, A., Keenan, M.K., Craven, D., Kitchen, R., Wilson, J. and Yada, R.Y., 1989. "Saginaw Gold: A yellow fleshed potato cultivar with medium high specific gravity and excellent chip and French fry quality after storage." *Am. Potato J.* Vol. 66. Pp. 303.

Coffin, R.H., Johnston, G.R., McKeown, A., Yada, R.Y., Wilson, M.K., Keenan, M., Fitts, W., Langenberg, W., Garton, R., Knibbe, E. and Reynolds, L., 1989. "Eramosa: A white fleshed first early tablestock potato cultivar." *Am. Potato J.* Vol. 66. Pp. 293.

Keenan, M.K., Baker, K., Coffin, R.H. and Yada, R.Y., 1989. "A histological examination of the white knot disorder in tubers of the cultivar Atlantic." *Am. Potato J.* Vol. 66. Pp. 489.

Leszkowiat, M., Yada, R.Y., Coffin, R.H., Stanley, D. and, McKeown, A., 1989. "Influence of location and harvest date on the chip colour, sugar content and yield of early potatoes in Southern Ontario." *Can. J. Plant Sci.* Vol. 69. Pp. 341.

Tenga, A.A., Marie, B.A. and Ormrod, D.P., 1989. "Utilization of a greenness meter for assessment of ozone injury to tomato leaves." *Hort Science.* Vol. 24. Pp. 514.

Vliegenthart, J.I., Yada, R.Y., Coffin, R.H. and Lougheed, E.C., 1989. "Sweet potato chips: A cultivar evaluation." *Abstract Can. Inst. Food Sci. Technol. J.* Vol. 22. Pp. 408.

BOOKS, THESES, REPORTS

Barichello, V., Yada, R.Y., Coffin, R.H. and Stanley, D.W., 1989. *Low temperature sweetening in susceptible and resistant potatoes. Respiratory enzyme activity.* Horticulture Council Report.

TREE FRUITS AND SMALL FRUITS

PERIODICALS

Erf, J.A. and Proctor, J.T.A., 1989. "Growth, leaf mineral nutrition and leaf water status of mature apple trees subjected to various crop lands and soil water conditions." *J. of Am. Soc. for Hort. Sci.* Vol. 114. Pp. 191-195.

Prive, J.P., Elfving, D.C. and Proctor, J.T.A., 1989. "Paclobutrazol, gibberellin and cytokinin effects on growth, development and histology of apple pedicels and fruits." *J. of Am. Soc. for Hort. Sci.* Vol. 114. Pp. 273-278.

Schechter, I. and Proctor, J.T.A., 1989. "Jonagold: An apple for the 21st century." *Fruit Varieties Journal.* Vol. 43. Pp. 4-6.

Sullivan, J.A. and Dale, A., 1989. "Intensive management of red raspberry in Eastern Canada." *Acta Horticulture.* Vol. 262. Pp. 405-410.

PROCEEDINGS

Elfving, D.C., Pierce, W.F., Prive, J.P. and Proctor, J.T.A., 1989. *Abstr. in Rpt. of Comm. on Hort. Res.*, Cdn. Hort. Council, Pp. 88. "Reversal of effects of paclobutrazol (PBZ) on growth and fruit quality of McIntosh apple trees with gibberellic acid.", "Reversal of effects of paclobutrazol (PBZ) on Spartan apple trees with gibberellic acid."

Lougheed, E.C., Wiley, L.S., Proctor, J.T.A. and Elfving, D., 1989. *Abstr. in Rpt. of Comm. on Hort. Res.*, Cdn. Hort. Council. Pp. 99. "Low-oxygen storage of McIntosh apples.", "Temperature — atmosphere effects in storage of "hard" apple cultivars."

Prive, J.P., Elfving, D.C. and Proctor, J.T.A., 1989. "Pedicel characteristics of four apple cultivars." *Abstr. in Rpt. of Comm. on Hort. Res.*, Cdn. Hort. Council. Pp. 89.

Shantz, G.M., Proctor, J.T.A. and Chiba, M., 1989. "Cytokinis in apple leaves and their relationship to spotted tentiform leafminer injury." *Abstr. in Rpt. of Comm. on Hort. Res.*, Cdn. Hort. Council. Pp. 89.

BOOKS, THESES, REPORTS

Proctor, J.T.A., 1989. *Introduction to the paper, The effect of seed formation on subsequent flowering in apple.* J. Janick (ed)., Classical papers in horticulture. Prentice-Hall, Englewood.

Proctor, J.T.A., 1989. The Grower. *Jonagold — an apple for Ontario?* Vol. 39(1). Pp. 12. *U.K. Horticultural research in jeopardy.* Vol. 39(7). Pp. 15.

Sangiacomo, M.A., 1989. *Evaluation of Advanced Strawberry Breeding Lines Derived from Guelph SO1 and SO2.* M.Sc. (Thesis), University of Guelph, Guelph.

ORNAMENTALS

PERIODICALS

Chong, C., Lumis, G.P. and Cline, R.A., 1989. "Effects of fabric containers." *Amer. Nurseryman.* Vol. 170 (11). Pp. 51, 53-55.

Lumis, G.P., 1989. "Container production featured in IPPS tour." Hort. *Rev. Vol.* 7(1). Pp. 27-28, 32-33.

Lumis, G.P. and Struger, S., 1989. *Hort. Rev.* "A comparison of 20-20-20 and 28-14-14." Vol. 7(8). Pp. 6-7. "Growth of Cornus using fertilizers that include micronutrients." Vol. 7(11). Pp. 6-7.

Struger, S. and Lumis, G.P., 1989. *Hort. Rev.* "A study of Nutricote 16-10-10 rates and ratios." Vol. 7(10). Pp. 6-7. "Evaluation of Nutricote 20-7-10 type 140." Vol. 7(9). Pp. 8-9. "Slow release fertilizers and micronutrients." Vol. 7(13). Pp. 13-14.

BOOKS, THESES, REPORTS

Goodwin, C., 1989. *Embedded wire in tree roots; Implications for tree growth and root function.* M.Sc. (Thesis).

WEEDS

PERIODICALS

Ekler, Z. and Stephenson, G.R., 1989. "Physiological responses of maize and sorghum to four different safeners for metazachlor." *Weed Research.* Vol. 29. Pp. 181-191.

Hofstra, G., Krieg, L.C. and Fletcher, R.A., 1989. "Uniconazole reduces ethylene and ACC and increases spermine synthesis in mung bean seedlings." *J. Pl. Growth Reg.* Vol. 8. Pp. 45-51.

Jotcham, J.R., Smith, D.W. and Stephenson, G.R., 1989. "Comparative persistence and mobility of pyridine and phenoxy herbicides in soil." *Weed Technology.* Vol. 3. Pp. 155-161.

Stephenson, G.R., 1989. "Triazine-resistant weeds — are we spreading the problem?" *Ontario Corn Producer,* May. Pp. 5-7.

Swanton, C.J. and Chandler, K., 1989. "Control of wild mustard in canola with postemergence herbicides." *Can. J. Plant Sci.*

Willis, R.G., Stephenson, G.R., Fletcher, R.A. and Prasad, R., 1989. "Seasonal variations in the tolerance of jack pine and white spruce to glyphosate and triclopyr." *Weed Technology.* Vol. 3. Pp. 33-38.

PROCEEDINGS

Alex, J.F. and Petrik, K., 1989. *Abstrs. in Exp. Comm. on Weeds Res. Rpt: East. Sect.* Pp. 704. "Fleabeetles overwintering on Cypress spurge in Ontario.", "Insect releases for biocontrol of Cypress spurge and plumeless thistle in Ontario, 1989."

Anderson, G.W. and Harris, R., 1989. *Res. Rpt. of the Expert Comm. on Weeds,* Saint John, N.B. "Ammonium sulphate and additives for glyphosate and quackgrass." Pp. 694 (Abstr.)., "Bromoxynil-mcpa combination on winter wheat underseeded to red clover." Pp. 29 (Abstr.)., "DPX 79406 for quackgrass control in corn." Pp. 560 (Abstr.)., "Fall treatments for field bindweed control." Res. Rpt. of the Expert Comm. on Weeds, Saint John, N.B. Pp. 560, (Abstr.)., "Fenoxaprop-ethyl on barley." Pp. 26 (Abstr.)., "Fenoxaprop-ethyl on spring wheat." Pp. 30 (Abstr.)., "F80 seed treatment safener for clomazone on corn." Pp. 78 (Abstr.)., "Herbicide trials on barley." Pp. 25 (Abstr.)., "Herbicide trials on oats." Pp. 27 (Abstr.)., "Herbicide trials on spring wheat." Pp. 31 (Abstr.)., "Herbicide trials on winter wheat." Pp. 28 (Abstr.)., "Herbicides for alfalfa seedlings." Pp. 2 (Abstr.)., "Herbicides for establishing red clover and trefoil." Pp. 3 (Abstr.)., "JAC 263, 499 effects on following crops." Pp. 4 (Abstr.)., "PPI treatments for corn." Pp. 73 (Abstr.)., "Pre and early postemergent treatments for corn." Pp. 74-76 (Abstr.)., "Quackgrass control in soybeans." Pp. 170 (Abstr.)., "RO 17-3364 for quackgrass control in soybeans." Pp. 169 (Abstr.)., "San 582 pre and early postemergent treatments for corn." Pp. 77 (Abstr.)., "SC022 for quackgrass control." Pp. 553 (Abstr.)., "Surfactants for 2,4-D LVE on dandelions." Pp. 559 (Abstr.)., "UBI 9076 and surfactants on spring cereal removal." Pp. 32 (Abstr.).

Chase, C.A., Souza-Machado, V., Coffin, R. and Fletcher, R.A., 1989. "Effect of triadimefon on in vitro produced potato plantlets." *Potato Assoc. meeting*, Oregon, U.S.A.

Fletcher, R.A., 1989. "Strategies for improvement of triazole-induced stress protection in wheat seedlings." *Amer. and Can. Soc. Pl. Physiol.* meetings, Toronto.

Mackay, C.W., Senaratna, T., McKersie, B.D., Hofstra, G. and Fletcher, R.A., 1989. "Freezing protection in wheat: Comparisons of physiological effects of acclimation and uniconazole on the microsomal membrane." *Gordon Conference*, California.

Pullen, J.E., Zandstra, J., Hofstra, G., Fletcher, R.A. and Payne, N. "Increasing drought tolerance in conifer seedlings with triazoles." *Forestry Research Marketplace*, Abstract No. 13. Pp. 10-11.

Stasiak, M., Hofstra, G. and Fletcher, R.A., 1989. "Assessment of phytotoxicity of sub-lethal glyphosate deposits on pin cherry and aspen." *Forestry Research Marketplace*. Abstract No. 42. Pp. 35.

Stasiak, M., Krieg, L., Hofstra, G. and Fletcher, R.A., 1989. "Uniconazole reduces both endogenous and triclopyr-induced ethylene in bean seedlings." *Amer. & Can. Soc. Pl. Physiol. meetings*, Toronto.

Stephenson, G.R., Dykstra, M.D., McLaren, R.D. and Hamill, A.S., 1989. "Agronomic practices and triazine-resistant weed distribution in Ontario." *Weed Technology* 4.

Swanton, C.J. and Chandler, K., 1989. *Res. Rpt. of the Expert Comm. on Weeds*, Saint John, N.B. "Adjuvants for annual weed control in no-till corn." East. Sect.: 89-CT-1. Pp. 521. (Abstr.)., "Adjuvants for annual weed control in no-till corn." *East. Sect.*. 89-CT-1. Pp. 521. (Abstr.)., "Adjuvants for annual weed control in no-till soybeans." 89-ST01. Pp. 524. (Abstr.)., "Annual grass control in soybeans." Pp. 293 (Abstr.)., "Annual grass control in spring canola." Pp. 71 (Abstr.)., "Annual weed control in no-till corn." 89-CT-2. Pp. 522. (Abstr.)., "Annual weed control in no-till soybeans" 89-ST-2. Pp. 525. (Abstr.)., "Annual weed control in soybeans." Pp. 291 & 292 (Abstr.)., "Annual weed control with soil applied herbicides in soybeans." Pp. 294 (Abstr.)., "Broadleaf weed control in soybeans." Pp. 288 (Abstr.)., "Clover burndown in no-till corn" 89-CC-1. Pp. 520. (Abstr.)., "Herbicide compatability." 89-HC-1. Pp. 527. (Abstr.)., "Hoe 039866 for dessication of white beans." Pp. 333 (Abstr.)., "Imazethapyr for annual weed control in soybeans" Pp. 290 (Abstr.)., "Postemergence control of volunteer winter wheat in winter rapeseed." Pp. 67 (Abstr.)., "Reduced rates of Glyphosate in no-till Quackgrass." 89-Q-2. Pp. 528 (Abstr.)., "San 582 for annual weed control in soybeans." Pp. 289 (Abstr.)., "Tillage and timing of Glyphosate application effects on Quackgrass." 89-Q-1. Pp. 529. (Abstr.)., "Tillage 2000 evaluation of recommended herbicides till 2000." Pp. 523. (Abstr.)., "UBI 9076 for annual grass control in soybeans." Pp. 288 (Abstr.)., "Winter wheat competition and time of control in winter rapeseed." Pp. 68 (Abstr.)., "Winter wheat cover crop control in soybeans." 89-SW-1. Pp. 526. (Abstr.).

BOOKS, THESES, REPORTS

Cain, N.P., 1989. *Weed control research in Ontario nursery container crops.* Final Rpt. to Ag. Cda., (New Crop Dev. Fund), OMAF, and Ont. Crop Imp. and Expansion Pgm.

Shupe, J. and Cain, N.P., 1989. Report to the Expert Committee on Weeds. Herbicides for deciduous and broadleaved evergreen container stock I.", *"Herbicides for deciduous and broadleaved evergreen container stock II."*, *"Herbicides for deciduous and broadleaved evergreen container stock III."*, *"Herbicides for deciduous container stock."*

Shupe, J., Cain, N. and Lumis, G., 1989. *Herbicide combinations in deciduous and broadleaved evergreen container crops.* Final Rpt. to Agr. Cda. (Minor use of Pesticides Pgm) and Landscape Ontario.

INSECTS

PERIODICALS

Braun, H.E., Frank, R. and Ritcey, G., 1989. "Removal of pyrazophos from treated fabric using household laundering." *Bull. Environ. Contam. Toxicol.* Vol. 42. Pp. 687-690.

Frank, R., Braun, H.E., Ritcey, G. and Stanek, J., 1989. "Pyrazophos residues from treated greenhouse and growth chamber grown chrysanthemums." *Can. J. Plant Sci.* Vol. 69. Pp. 961-966.

Sears, M.K. and Boiteau, G., 1989. "Parasitism of Colorado potato beetle (Coleoptera: Chrysomelidae) eggs by Edovum puttleri (Hymenoptera: Eulophidae) on potato in eastern Canada." *J. Econ. Entomol.* Vol. 82(3). Pp. 803-810.

Wang, T. and Laing, J.E., 1989. "Diapause termination and postdiapausal development of Holcothorax testaceipes (Hymenoptera: Encyrtidae), an introduced parasitoid of the spotted tentiform leafminer." *Can. Ent.* Vol. 121. Pp. 65-74.

Wang, T. and Laing, J.E., 1989. "Polyembryony in Holcothorax testaceipes (Hymenoptera: Encrytidae)." *Ann. Ent. Soc. Amer.*, Vol. 82. Pp. 725-729.

PROCEEDINGS

Braun, H.E., Frank, R., Ripley, B., Ritcey, G. and McEwen, F.L., 1989. "Pesticide use in lettuce." Abstr. in *Pesticide Res. Rpt., Exp. Comm. on Pesticide use in Agric.*

Frank, R., Ripley, B., Ritcey, G. and McEwen, F.L., 1989. "Residue in parsnips." Abstr. in *Pesticide Res. Rpt., Exp. Comm. on Pesticide Use in Agric.*

Ripley, B., Frank, R., Braun, H.E., Ritcey, G. and McEwen, F.L., 1989. "Pesticide residue in celery." Abstr. in *Pesticide Res. Rpt., Exp. Comm. on Pesticide Use in Agriculture.*

Ritcey, G. and McEwen, F.L., 1989. Abstr. in *Pesticide Res. Rpt., Exp. Comm. on Pesticide Use in Agriculture.* "Insecticide foliar treatment to control thrips on onions.", "Pesticides for onion maggot control."

Ritcey, G. and McEwen, F.L., 1989. Abstr. in *Rpt. of Comm. on Hort. Res.*, Cdn. Hort. Council. "Insecticide foliar treatment to control thrips on onions.", "Pesticides for onion maggot control.", "Pesticides for onion maggot control — precision seeding."

Ritcey, G., McEwen, F.L. and Frank, R., 1989. Abstr. in *Rpt. of Comm. on Hort. Res.*, Cdn. Hort. Council. "Insecticide residue in cucumber.", "Pesticide residue in celery.", "Pesticide residue in lettuce.", "Pesticide residue in tomatoes."

Ritcey, G., McEwen, F.L., Frank, R. and Braun, H.E., 1989. Abstr. in *Pesticide Res. Rpt.* "Insecticide residue in cucumbers.", "Insecticide residue in tomatoes."

Ritcey, G., McEwen, F.L., Frank, R. and Ripley, B., 1989. Abstr. in *Pesticide Res. Rpt.* "Fungicide residue in green peppers.", "Fungicide residue in onions as a result of foliar treatments."

Ritcey, G., McEwen, F.L., Frank, R., Braun, H.E. and Ripley, B., 1989. "Pesticide residue in tomatoes." Abstr. in *Pesticide Res. Rpt.*

Ritcey, G., McEwen, F.L., MacDonald, M.R. and Burbridge, H., 1989. "Pesticides for onion maggot and smut control — precision seeding." Abstr. in *Pesticides Res. Rpt., Exp. Comm. on Pesiticide Use in Agric.*

BOOKS, THESES, REPORTS

Stoewen, J.F., 1989. *Winter survival of corn rootworm (Coleoptera: Chrysomelidae) eggs in southern Ontario.* M.Sc. (Thesis), Univ. of Guelph, 110 pp.

PLANT DISEASES

PERIODICALS

Barron, G.L., 1989. "Host range studies for Haptoglossa and a new species. Haptoglossa intermedia." *Can. J. Bot.*, Pp. 1645-1648.

Hall, R. and Mwiindilila, C., 1989. "Prediction of white mold in white bean and snap bean." *Ann. Rpt. Bean Imp. Coop.* Vol. 32. Pp. 107-108.

PROCEEDINGS

Mwiindilila, C. and Hall, R., 1989. *Can. Phytopathol. Soc.*, Montreal, Quebec, "Epidemiology and control of white mold in snap bean." July 10., "Forecasting white mold in white bean." July 11.

Mwiindilila, C. and Hall, R., 1989. "Prediction of white mold in common bean." *Bean Improvement Co-operative Biennial Meeting*, Toronto, Nov. 8.

BOOKS, THESES, REPORTS

Wright, K.H., 1989. *Epidemiology of tan spot of winter wheat in Ontario.* M.Sc. (Thesis), University of Guelph, Guelph, 100 pp.

TURF GRASS

PROCEEDINGS

Hall, J.C., Deschamps, R.J.A. and McDermott, M.R., 1989. "Immunoassays for detecting pesticides in the environment." Abstrs. in *Highlights of Agric. Res. Ont.* Vol. 12(2). Pp. 19-23.

BOOKS, THESES, REPORTS

Eggens, J.L. and Carey, K., 1989. Guelph Turfgrass Institute Ann. Res. Rpt. *Urban waste composted with sewage sludge as a fertilizer on bentgrass putting green and fairway type turf.* Pp. 9., *Turf renovation by sodding — site preparation intensity and timing in low maintenance sites.* Pp. 23.

Eggens, J.L., McCollum, N. and Carey, K., 1989. Guelph Turfgrass Institute Ann. Res. Rpt. *Fine fescue and tall fescue cultivar evaluation.* Pp. 66., *Kentucky bluegrass cultivar evaluation.* Pp. 68., *Perennial ryegrass cultivar evaluation.* Pp. 73., *Sports turf mixture evaluation and the effect of wear on sports turf mixtures.* Pp. 75., *Tall fescue cultivar evaluation.* Pp. 71.

Voroney, R.P., Carey, K., Anderson, A. and Eggens, J.L., 1989. *Leaching of nitrogen from slow release fertilizers on turf in sand rootzones.* Guelph Turfgrass Institute Ann. Res. Rpt. Pp. 11.

BEES: HONEY AND POLLINATION

PERIODICALS

Dawicke, B.L., Otis, G.W. and Scott-Dupree, C.D., 1989. "Predicting trachael mite infestations and effects on colonies." *American Bee Journal.* Vol. 129. Pp. 814.

Otis, G.W. and Scott-Dupree, C.D., 1989. "Trachael mite infestations and colony performance in New York." *American Bee Journal.* Vol. 129. Pp. 820.

Southwick, E.E., 1989. "Bee research digest: Living with honey bee mites. Summary of mite research." *American Bee Journal.* Vol. 129. Pp. 745-746.

PROCEEDINGS

Scott-Dupree, C., 1989. "The Efficacy of Miticides to Control Acarapis woodi." *Britisb Columbia Honey Producers' Assoc. Annual meeting*, Nov. 23-26, 1989.

Scott-Dupree, C., 1989. "The New York Miticide Trials." *Ontario Beekeepers' Association Annual Meeting.* December 6-8, 1989, Toronto, Ont.

FOOD

PERIODICALS

Barbut, S. and Mittal, G.S., 1989. "Effects of freezing rate on the gelatin and rheological properties of poultry meat batters." *35th Int. Congr. of Meat Sci. & Technol. Proc.* Pp. 768-770.

Barbut, S. and Mittal, G.S., 1989. *Can. Agric. Eng.* "Effects of salt and fat reduction on the rheological and gelation properties of turkey meat batters." Vol. 3. Pp. 271-277., "Effects of salt and fat reduction on the rheological and gelation properties of poultry meat batters." Vol. 31. Pp. 271.

Barbut, S. and Mittal, G.S., 1989. "Effects of salt reduction on the rheological and gelation properties of beef, pork and poultry meat batters." *Meat Sci.* Vol. 26. Pp. 177-191.

Barbut, S. and Mittal, G.S., 1989. "Influence of K and Ca on the rheological and gelation properties of reduced fat pork sausages containing carrageenans." *J. Food Sci. Technol.* Vol. 23. Pp. 124-132.

Barbut, S., Draper, H.H. and Cole, P.D., 1989. "Effects of mechanical deboner head pressure on lipid oxidation in poultry meat." *J. Food Prot.* Vol. 52. Pp. 21.

Barichello, V., Stanley, D.W., Yada, R.Y. and Coffin, R.H., 1989. "Possible influence of starch granule composition on low temperature sweetening." Abstract *Can. Inst. Food Sci. Technol. J.* Vol. 22. Pp. 413.

Bendall, J.R. and Swatand, H.J., 1989. "A review of the relationships between pH and physical aspects of pork quality." *Meat Sci.* Vol. 24. Pp. 85-126.

Bernal, V.M. and Stanley, D.W., 1989. "Methylcellulose as a binder for reformed beef." *Int. J. Food Sci. Technol.* Vol. 24. Pp. 461-464.

Coffin, R.H., Chase, R., Thompson, N., Johnston, G., McKeown, A., Keenan, M.K., Craven, D., Kitchen, R., Wilson, J. and Yada, R.Y., 1989. "Saginaw Gold: A yellow fleshed potato cultivar with medium high specific gravity and excellent chip and french fry quality after storage." *Am. Potato J.* Vol. 66. Pp.303.

Coffin, R.H., Johnston, G.R., McKeown, A., Yada, R.Y., Wilson, L., Keenan, M.K., Fitts, M., Langenberg, W., Garton, R., Tribe, E. and Reynolds, L., 1989. "Eramosa: A white fleshed first early tablestock potato cultivar." *Am. Potato J.* Vol. 66. Pp. 293.

Leszkowiat, M., Yada, R.Y., Coffin, R.H., Stanley D.W. and McKeown, A., 1989. "Influence of location and harvest date on the chip colour, sugar content and yield of early potatoes in southern Ontario." *Can. J. Plant Sci.* Vol. 69. Pp. 341.

Marangoni, A.G. and Stanley, D.W., 1989. "Phase transitions in microsomal membranes from chilling sensitive and chilling resistant tomato plants and fruit." *Phytochemistry.* Vol. 28. Pp. 2293-2301.

Marangoni, A.G., Smith, A.K., Yada, R.Y. and Stanley, D.W., 1989. "Ultrastructural changes associated with chilling injury in mature-green tomato fruit." *J. Amer. Soc. Hort. Sci.* Vol. 114. Pp. 958-962.

Meiering, A.G., Subden, R.E. and Hayward, G., 1989. "Adaptive fermentation control by microcomputer." *Transaction of the ASAE*. Vol. 32(4). Pp. 1470-1476.

Mittal, G.S. and Barbut, S., 1989. *J. Texture Studies*. Vol.20(2). "Effects of salt reduction on the rheological and gelation properties of poultry meat." Pp. 209., "Effects of salt reduction on the rheological and gelation properties of white and dark poultry meat." Pp. 209-222.

Mittal, G.S., Lin, C.W. and Barbut, S., 1989. "Role of various processes in manufacturing a low sodium restructured ham." *35th Int. Cong. of Meat Sci. & Technol. Proc.*

Mittal, G.S., Wang, C.Y. and Usborne, W.R., 1989. "Thermal properties of emulsion type sausages during cooking." *Can. Inst. Food Sci. Technol.* Vol. 22(4). Pp. 359-363.

Shattuck, V.I., Brolley, B., Stubbs, L.W. and Lougheed, E.C., 1989. "The effect of turnip mosaic virus infection on the mineral content and storability of field-grown rutabaga." *Commun. Soil Sci. and Plant Anal.* Vol. 20(5&6). Pp. 581-595.

Stanley, D.W. and Plhak, L.C., 1989. "Fluorescence intensity indicates bean hardening." *J. Food Sci.* Vol. 54. Pp. 1078-1079.

Swatland, H.J., 1989. *Cdn. Inst. Food Sci. Technol. J.* Vol. 22. "A review of meat spectrophotometry (300 to 800 nm)." Pp. 390-402., "Relationships between surface and internal reflectance in pork." Pp. 165-169.

Swatland, H.J., 1989. "Effect of temperature (00 to 800 c) on the interior reflectance of ovine sternomandibularis muscle." *Int. J. Food Sci. Technol.* Vol. 24. Pp. 503-510.

Swatland, H.J., 1989. "Morphometry of pectoral development in turkey breeding stock." *Brit. Poultry Sci.* Vol. 30. Pp. 787-797.

Swatland, H.J., Irving, T.C. and Millman, B.W., 1989. "Fluid distribution in pork, measured by x-ray diffraction, interference microscopy and centrifugation compared to paleness measured by fiber optics." *J. Anim. Sci.* Vol. 67. Pp. 1465-1470.

Thomas, R., deMan, J.M. and DeMan, L., 1989. "Soymilk and tofu properties as influenced by soybean storage conditions." *J. Am. Oil Chem. Soc.* Vol. 66. Pp. 777-782.

Weaver, B.J., Corner, E.J., Bruce, V.M., MacDonald, B.E. and Holub, B.J., 1989. "Dietary canola oil: effect on the accumulation of eicosapentaenoic acid in the alkenylacyl fraction of human platelet ethanolamine phosphoglyceride." *Am. J. Clin. Nutr.* Vol. 51. Pp. 594-598.

PROCEEDINGS

Barbut, S. and Mittal, G.S., 1989. "Influence of freezing rate and storage time on the gelation and rheology of meat batters." *35th Inter. Congr. of Meat Sci.*, Copenhagen, Denmark.

Blankson, J.E., Coffin, R.H., Yada, R. and Lougheed, E.C., 1989. "Respiration rates of potatoes as influenced by storage carbon dioxide." Abstr. in *Rpt. of Comm. on Hort. Res.*, Cdn. Hort. Council. Pp. 76.

Coffin, R.H., Keenan, M.K. and Yada, R.Y., 1989. "Promising varieties and new breeding lines in Ontario trials." *Proc., Potato Day, Hort. Crop Conf.*

Coffin, R.H., Yada, R.Y., Lougheed, E.C., Keenan, M.K. and Slavnik, M., 1989. "Effects of gamma irradiation on sprout control, sugar content and chop quality in potato." Abstr. in *Rpt. of Comm. on Hort. Res.*, Cdn. Hort. Council. Pp. 76.

Elfving, D.C. and Lougheed, E.C., 1989. "Chemical thinning of apple with 6-benzyladenine in 1988." Abstr. in *Prog. and Abstracts, 86th Ann. Mtg. Amer. Soc. Hort. Sci.*, Tulsa, Oklahoma.

Elfving, D.C., Pierce, W.F. and Lougheed, E.C., 1989. "Effects of Alar and PBZ application in 1987 on McIntosh fruit drop and quality." Abstr. in *Rpt. of Comm. on Hort. Res., Cdn. Hort.* Council. Pp. 95 & Pp. 98.

Lougheed, E.C. and Feryn, S., 1989. "Controlled atmosphere storage of broccoli." Abstr. in *Rpt. of Comm. on Hort. Res.*, Cdn. Hort. Council. Pp. 120.

Lougheed, E.C. and Perkin, S., 1989. "Controlled atmosphere storage of cabbage." Abstr. in *Rpt. of Comm. on Hort. Res.*, Cdn. Hort. Council. Pp. 123.

Lougheed, E.C., Feryn, S. and Wiley, L.S., 1989. "Controlled atmosphere storage of Chinese cabbage." Abstr. in *Rpt. of Comm. on Hort. Res.*, Can. Hort. Council. Pp. 181.

Lougheed, E.C., Perkin, S., Valk, M. and Knibbe, E., 1989. "Controlled atmosphere storage of celery." Abstr. in *Rpt. of Comm. on Hort. Res., Cdn. Hort. Council.* Pp. 130.

Lougheed, E.C., Wiley, L.S., Proctor, J.T.A. and Elfving, D.C., 1989. Abstr. in *Rpt. of Comm. on Hort. Res.*, Cdn. Hort. Council. Pp. 99. "Low-oxygen storage of McIntosh apples.", "Temperature-atmosphere effects on storage of "hard" apple cultivars."

Marek, M.S. and Glanville, T., 1989. "The effect of culture conditions on phospholipid fatty acid composition of rat neurons maintained in primary culture." *32nd Ann. Mtg. Cdn. Fed. of Biol. Soc.*, Calgary, Alberta.

Meiering, A.G. and Subden, R.E., 1989. "Development of ethanol sensor for biofuel fermentation." *Seventh Cdn. Bioenergy Seminar of DEMR*, Ottawa, June.

Mittal, G.S. and Barbut, S., 1989. "Influence of various ingredients and processes on meat batter gelation." *Can. Inst. Food Sci. Technol.*, Quebec City, Quebec.

Mittal, G.S. and Correia, L.R., 1989. "Meat batter filler selection based on cooking kinetics parameters." *35th Int. Congress of Meat Sci. & Technol.* Pp. 771-775.

BOOKS, THESES, REPORTS

Blankson, J., Yada, R.Y., Coffin, R.H. and Lougheed, E.C., 1989. *Storage carbon dioxide and the chip quality of several chipping potato cultivars.* Abstr. in Rpt. of Comm. on Hort. Res, Cdn. Hort. Council. Pp. 76.

Coffin, R.H., Keenan, M.K., Yada, R.Y., Tai, G., Slavnik, M. and Johnston, G.R., 1989. *Inheritance of genetic factors controlling chip processing quality after tuber storage at low temperatures.* Rpt. of Comm. on Hort. Res., 1988. Pp. 57.

Coffin, R.H., Yada, R.Y., Lougheed, E.C., Keenan, M.K. and Slavnik, M., 1989. *Effects of gamma irradiation on sprout control, sugar content and chop quality in potato.* Rpt. of the Comm. of Hort. Res., 1988. Pp. 69.

Correia, L.R. and Mittal, G.S., 1989. *Relationship between cooking kinetics and meat batter filler selection.* Can. Inst. Food Sci. Technol. Conf.

Lin, G.C.W., 1989. *The effects of tumbling and potassium chloride on low sodium restructured ham.* M.Sc. (Thesis), Univ. of Guelph, Guelph.

Haynes, J.P. and Meiering, A.G., 1989. *Automated data acquisition and management with a microcomputer.* ASAE Summer Meeting, Quebec City, Quebec.

Johnson, P. and Stanley, D.W., 1989. *Restructuring beef highlights.* Highlights. Vol. 12(4). Pp. 9-11.

Yada, R.Y. and Stanley, D.W., 1989. *Report of research conducted in the Dept. of Food Science, University of Guelph.* Ann. Prog. Rpt. of Reg. Potato Trials in Ont., 1988.

AGROMETEOROLOGY

PERIODICALS

Brown, Murray D., 1989. "Irrigation needs in Ontario: A model to determine crop yield response for economic assessment." *Highlights of Agricultural Research in Ont.* Vol. 11(4). Pp. 15-18.

Fuentes, J.D. and King, K.M., 1989. "Leaf photosynthesis and leaf conductance of maize grown hydroponically and in soil under field conditions." *Agric. For. Meteorol.* Vol. 45. Pp. 155-166.

Graham, M.E.D. and Thurtell, G.W., 1989. *Agric. and Forest Meteor.* Vol. 44. "Calibration of a small infrared sensor for measuring leaf temperature in the field: Nonsteady state conditions." Pp. 295-305., "The effect of increased transpiration on photosynthesis of corn. Part 1: A field portable single plant enclosure system." Pp. 307-316.

Keikinheimo, M., Thurtell, G.W. and Kidd, G.E., 1989. "An open path IR gas analyser for simultaneous eddy-correlation measurements of carbon dioxide and water vapour." *J. Atmos. Oceanic Technol.* Vol. 6(4). Pp. 624-636.

Singh, G., Brown, D.M., Barr, A.G. and Jung, R., 1989. "Scheduling irrigation for potatoes using a crop growth model." *Paper 892686 Am. Soc. of Agric. Eng.*, St. Joseph, Mich. 10 pp. poster paper pres.

Wilson, J.D., Ferrandino, F.J. and Thurtell, G.W., 1989. "A relationship between deposition velocity and trajectory reflection probability for use in stochestic lagrangian dispersion models." *Agric. and Forest Meteor.* Vol. 47. Pp. 139-154.

PROCEEDINGS

Barr, A.G., King, K.M., Gillespie, T.J., Groot, A., de Hartog, G. and Newmann, H.H., 1989. "Simultaneous measurements of sensible heat, water vapour and carbon dioxide flux densities above forest and alfalfa." *Agricultural Institute of Canada Annual Conference*, July 9-13, Montreal, Quebec.

Brown, D.M., Singh, G. and Barr, A.G., 1989. "Monitoring soil moisture status for irrigation of potatoes." *Abstract of proceedings of the Canadian Society of Agrometeorology. AIC Conference*, Montreal, Quebec. Pp. 11-12.

Coffey, W. and Dixon, M., 1989. "Differential water relations of three potato cultivars. (Scientific Program)." *Ann. Mtg. Am. Soc. of Pl. Physiol.*, Toronto, July 30-Aug. 3. Suppl. to Plant Physiology.

Leclerc, M.Y. and Thurtell, G.W., 1989. "Footprint predictions of scalar fluxes and concentration profiles using a Markovian approach." *Proc. 19th Conf. on Agr. and Forest Meteor.*, Am. Meteor. Soc., Charlottetown, N.C., March.

Srivastava, B., Pitblado, R.E. and Gillespie, T.J., 1989. "Estimation of disease severity in tomatoes from standard weather station data in Ontario, Canada." *Proc. 19th Conf. Agric. and Forest Meteorol.*, Charleston, S.C., March 7-10. Pp. 64-66.

BOOKS, THESES, REPORTS

Brown, D.M., Dixon, M.E. and Coffey, W.L.P., 1989. *Development of an Irrigation Scheduling Method for the Potato Crop in Ontario.* Final rpt. to OMAF on Spec. Res. Proj. #SR8803-HC001. Depts. of L.R.S. and Hort.

Campbell, A., 1989. *Determination of the soil hydraulic properties using a tension infiltrometer.* M.Sc. (Thesis), Univ. of Guelph, Guelph.

Coffey, W.L.P., 1989. *The morpho-physiological response of three cultivars of potato, Solanum tuberosum, to varying levels of drought stress.* M.Sc. (Thesis), Univ. of Guelph, Guelph, 121 pp.

Singh, G., 1989. *Modelling soil water status for irrigation scheduling in potatoes.* M.Sc. (Thesis), Univ. of Guelph, Guelph, 229 pp.

STREAMWATER MANAGEMENT IN AGRICULTURAL WATERSHEDS

PERIODICALS

Borah, M.K., Rudra, R.P. and Dickinson, W.T., 1989. "Application of Green and Ampt infiltration equation in overland flow simulation." *ASAE Paper No. 89-2169. Am. Soc. Agr. Eng.*, St. Joseph, Mich.

Dickinson, W.T., Rudra, R.P. and von Euw, E., 1989. "Sensitivity of NPS models to net rainfall." *ASAE Paper No. 89-20 37, Amer. Soc. Agr. Eng.*, St. Joseph, Mich.

Rudra, R.P., Dickinson, W.T., and Wall, G.J., 1989. "The role of hydrometeorological and soil conditions in soil erosion and fluvial sedimentation." *Cdn. Agr. Eng. Vol.* 31(2). Pp. 107-115.

Rudra, R.P., Dickinson, W.T., Elrick, D.E. and Wall, G.J., 1989. "Sensitivity of time to ponding, runoff rate and runoff amount fo soil water characteristics." *ASAE Paper No. 89-2165, Amer. Soc. Agr. Eng.*, St. Joseph, Mich.

PROCEEDINGS

Hohner, B.K., Wall, G.J., Dickinson, W.T. and Rudra, R.P., 1989. "A portable rainfall simulator for on-site erosion and agronomic studies." *Ann. Mtg., Can. Soc. Soil Sci.*, Montreal, Quebec.

Rousseau, A., Dickinson, W.T., Rudra, R.P. and Saul, S.I., 1989. "Prediction for overland phosphorus transport using a phosphorus enrichment ratio." *Proc. (revised) ASCE Nat. Water Conf.* Pp. 212-217.

Rudra, R.P., Dickinson, W.T. and Wall, G.J., 1989. "Guelph Agr. Model for Erosion and Sedimentation." *Ann. Mtg., Can. Soc. Soil Sci.*, Montreal, Quebec.

Wall, G.J., Pringle, E.A. and Dickinson, W.T., 1989. "Assessment of agricultural nonpoint source pollution potentials in the Canadian Great Lakes Basin." *Ann. Mtg., Can. Soc. Soil Sci.*, Montreal, Quebec.

von Euw, E., Dickinson, W.T. and Rudra, R.P., 1989. "Comparison of non-point source pollution models." *ASAE Paper No. 89-2038, Amer. Soc. Agr. Eng.*, St. Joseph, Mich.

BOOKS, THESES, REPORTS

Dickinson, W.T., Rudra, R.P. and Wall, G.J., 1989. *Simulation of remedial measures and remedial strategies for soil conservation.* ASAE Paper No. 89-7045, Am. Soc. Agr. Eng., St. Joseph, Mich.

Dickinson, W.T., Wall, G.J., and Rudra, R.P., 1989. *Model building for predicting and managing soil erosion and transport.* Soil Erosion on Agricultural Land. (Ed. John Boardman). John Wiley & Sons Ltd., London.

LAND USE

PERIODICALS

Bootsma, A. and Brown, D.M., 1989. "Spring and autumn freeze risk in Ontario." *Climatological Bull.* Vol. 23(2). Pp. 43-59.

Brown, D.M. and Place, R.E., 1989. "Rating climate in southwestern Ontario for horticultural crops." *Can. J. Plant Sci.* Vol. 69. Pp. 325-336.

Flaherty, M., Smit, B., Webber, M. and Reeds, L., 1989. "Agricultural land use flexibility: the concept and some measures." *Res. Mgmt. & Opt.* Vol. 6 (2). Pp. 29-51.

Penfold, G.E., Matthews-Glenn, J., Flaming, D. and Brown, D., 1989. "Right to Farm in Canada." *Plan Canada.* Vol. 29, no. 2. Pp. 47-55.

Shipitalo, M.J. and Protz, R., 1989. "Chemistry and micromorphology of aggregation in earthworm casts." *Geoderma.* Vol. 45. Pp. 357-374.

Smit, B. and Kristjanson, J., 1989. "Parametric approaches to rating the importance of lands for agriculture." *J. Environ. Mgmt.* Vol. 29 (4). Pp. 323-332.

Smit, B., Brklacich, M., Stewart, R.B., McBride, R., Brown, M. and Bond, D., 1989. "Sensitivity of crop yields and land resource potential to climatic change in Ontario, Canada." *Climatic Change.* Vol. 14(2). Pp. 153-174.

van Vuuren, W. and Fox, G., 1989. "Estimating the costs of Soil Erosion: Comment." *Cdn. J. of Agr. Econ.* Vol. 37(3). Pp. 549-554.

PROCEEDINGS

Brown, D.M., 1989. "Using climate in land ratings for horticultural crops." *Proc. of workshop on the appl. of climate and weather info. to the farm*, Pp. 104-121.

Cihlar, J., Protz, R. and Provost, J., 1989. "Soil erosion assessment using remotely sensed data." *Proc. of the Eleventh Can. Symposium on Remote Sensing.* Vol. 1. Pp. 395-407.

Dickson, E.J. and Fox, G., 1989. "The Economics of Erosion control on cropland in southwestern Ontario." *Paper presented at 24th Cdn. Symp. on water pollution research*, Cdn. Centre for Inland.

Fox, G., 1989. "Agriculture and the Environment: The Economic Research Agenda." *Pres. to the Env. Res. Network*, Univ. of Guelph, Guelph, April 3.

Fox, G., 1989. "The Economics of Our Common Future." *Pres. to Conf. on Sust. Development and Agr.*: Economics & Ethics, Univ. of Guelph, Guelph.

Fox, G., 1989. "Why I Worry and Why I Don't Worry about Soil Erosion." *Pres. to the Dept. of Agr. Econ.*, Michigan State Univ., East Lansing, Mich., Nov. 9.

Manore, M.J., Protz, R. and Proud, B.A., 1989. "Integrated image-map products for township level land information." *IGARSS '89 (12th Cdn. Symp. on remote sensing)*, Abstract in Vol. 1. Pp. 77-80.

McCabe, D.C., Protz, R. and Tomlin, A.D., 1989. "The distribution of gamma emitting radionuclides in four forested soils of southern Ontario: The effect of fauna." *Inter. Conf. on Metals in Soils, Waters, Plants and Animals.*, Orlando, Florida.

Nurwadjedi, A., Protz, R. and Cihlar, J., 1989. "Sensitivity of reflected radiation to organic matter content of typical Ontario soils." *IGARSS '89 (12th Cdn. Symp. on Remote Sensing)*, Abstract in Vol. 2. Pp. 678.

Proud, B.A., Protz, R. and Manore, M., 1989. *IGARSS '89 (12th Cdn. Symp. on Remote sensing)*, Abstract in Vol. 3. Pp. 1185. "A methodology for relating airborne SAR data to soil properties on a pixel basis.", "Temporal changes in radar backscatter due to soil moisture and change in crop canopies."

Rodd, R.S. and Penfold, G.E., 1989. "Socio-economic factors in local land rating." *Pres. to the Cdn. Agricultural Ec. and Farm Mgmt. Society.*

Smith, B., 1989. "Likely impact of climate change on Canadian agriculture?" *Proc. of 2nd N. Amer. Conf. on Preparing for climatic change*, Washington, D.C.

Taylor, J. and Brown, R.D., 1989. "Global Opportunities for business and the environment." *Pres. & Display at "Globe '90"*, Int'l. Conf. in Vancouver, B.C., March.

van Vuuren, W. and Roy, P., 1989. "Economic evaluation of wetland preservation." *Proc. of Wetlands Conf. in Toronto*, Fed. of Ont. Naturalists. Pp. 229-234.

BOOKS, THESES, REPORTS

Dickson, E.J. and Fox, G., 1989. *The Costs and Benefits of Erosion Control on Cropland in Southwestern Ontario.* Publ. AEB/89/3, Dept. of Agr. Econ. & Bus., Univ. of Guelph, Guelph, March.

Flaming, D., 1989. *An Exploratory study of incompatible land uses in an Agricultural-Residential Context.* M.A. (Major paper), U.S.R.P.D.

Fox, G., 1989. *The Economics of our Common Future.* Discussion Paper DP89/1., Dept. of Agr. Econ. & Bus., Univ. of Guelph, Guelph, May.

Fox, G., Weersink, A., Sarwar, G. and Duff, S., 1989. *Comparative economics of alternative agricultural production systems: a review.* Interim Rpt., subm. to the Ont. Corn Prod. Assoc., December.

Mage, J.A., 1989. *The Development of Macro-Scale Performance Indices for Agriculture in Southern Ontario.* Occ. Papers in Geog., No. 10, Dept. of Geog., Univ. of Guelph, Guelph.

Mage, J.A. and Fletcher, S., 1989. *The Recent Migration of Mennonite Farmers into the Mount Forest area of Ontario — Phase I: Location and General Land Use Characteristics.* Occ. Papers in Geog., No. 13, Dept. of Geog., Univ. of Guelph, Guelph.

Michailaidis, A., 1989. *A Test of Halton's Agricultural Land Evaluation System.* M.Sc. (Major Paper), U.S.R.P.D.

Penfold, G.E., 1989. *Agricultural Land Evaluation System.* Report to the Region of Halton, File AGO6A.

Smithers, J., 1989. Soil Conservation Practices in Agriculture: *Farm Level Barriers to Adoption.* M.A. (Thesis), University of Guelph, Guelph.

Smithers, J. and Smit, B., 1989. *Conservation practices in Southwestern Ontario Agriculture: Barriers to adoption.* Publ. No. LEG-28, U.S.R.P.D., Univ. of Guelph, 93 Pp.

Taylor, J., 1989. *Geographical Information Systems in Land Use Planning: Case Studies in Eramosa Township, Wellington County, Ontario.* Report, Aug. '89, School of Land. Arch., Univ. of Guelph, Guelph, 112 Pp.

CROP AND SOIL MANAGEMENT

PERIODICALS

Barry, D.A.J., Miller, M.H. and Bates, T.E., 1989. "Ear leaf and seedling P concentration and Dris indices as indicators of P nutrition of maize." *Common Soil Sci. & Plant Anal.* Vol. 20. Pp. 1397-1412.

Elrick, D.E. and Clothier, B.E., 1989. "Solute transport and leaching." ASA Monograph on "Irrigation of Agr. Crops". *Am. Soc. of Agron., Agron. Monograph 30.*

Elrick, D.E., Reynolds, W.D. and Tan, K.A., 1989. "Hydraulic conductivity measurements in the unsaturated zone using improved wall analyses." *Ground Water Monit. Rev.* Vol. 9, No. 3. Pp. 184-193.

Nickling, W.G. and McKenna-Neuman, C., 1989. "A theoretical and wind tunnel investigation of the effect of capillary water on the entrainment of sediment by wind." *Can. J. of Soil Sci.* Vol. 69. Pp. 79-96.

Richards, J.E. and Bates, T.E., 1989. "Studies on the potassium — supplying capacities of Southern Ontario soils. III. Measurement of available K." *Can. J. Soil Sci.* Vol. 69. Pp. 597-610.

PROCEEDINGS

Beauchamp, E.G., Kachanoski, R.G. and Bates, T.E., 1989. "A nitrogen soil test for corn in Ontario." *Proc. of 19th Extension Industry Soil Fertility Workshop.* St. Louis, Missouri.

BOOKS, THESES, REPORTS

Guobadia, Imasogie, 1989. *Synthesizing hydraulic conductivity/drainable porosity ratio (k/f) for selected Ontario soils.* M.Sc. (Thesis), Faculty of Grad. Studies, Univ. of Guelph, Guelph.

Kennedy, B. and Kachanoski, R.G . 1989. *Nitrogen management in conservation tillage systems for corn.* Ont. Min. of Agric. and Food Factsheet.

Sheehan, D. and Dickinson, W.T., 1989. *Development of a riser inlet.* Contr. Res. Rpt. to OMAF, School of Engin. Univ. of Guelph, Guelph.

FARM MANAGEMENT, PRODUCTION ECONOMICS, RESOURCES AND INPUTS

PERIODICALS

Fox, G., Widmer, L. and Brinkman, G., 1989. "Benefit analysis of agricultural research: Reply." *Cdn. J. of Agric.* Econ. Vol. 37(1). Pp. 149-152.

Haque, A.K.E., Fox, G. and Brinkman, G., 1989. "Product market distortions and the returns to federal laying hen research in Canada." *Cdn. J. of Agric. Econ.* Vol. 37(1). Pp. 29-46.

Huot, M.F., Fox, G. and Brinkman, G., 1989. "Returns to swine research in Canada." *North Central Journal of Agric. Econ.* Vol. 11(2). Pp. 89-202.

Oxley, J., Fox, G. and Moschini, G., 1989. "An analysis of the structural and welfare effects of bovine somatotropin on the Ontario dairy industry." *Cdn. J. of Agric. Econ.* Vol. 37(3). Pp. 393-406.

Smit, B., and Brklacich, M., 1989. "Sustainable development and the analysis of rural systems." *Journal of Rural Studies.* Vol. 5(4). Pp. 363-375.

Zachariah, O.E.R., Fox, G. and Brinkman, G.L., 1989. "Product market distortions and the returns to broiler chicken research in Canada." *J. of Agric. Econ.* Vol. 40(1). Pp. 40-51.

PROCEEDINGS

Fox, G., 1989. "Critical success factors." *OAC Agricultural Conference*, Guelph, January 3.

Fox, G., 1989. "The demand and supply sides to technological change in Agriculture." *Promises and Realities in Biotechnology*, Proc. of Biotechn., Day V, Guelph-Waterloo.

Fox, G. and Dickson, E., 1989. "Farm growth in the Ontario dairy industry: A skeptical look at Gibrat's Law." *Presented at meetings of the NC-181 Regional Committee on Farm Structure*, Tucson, Arizona.

BOOKS, THESES, REPORTS

Bray, J., 1989. *A land use viability approach for the identification of agriculturally marginal areas in Ontario.* M.A. (Thesis), Univ. of Guelph, Guelph.

Fox, G., Roberts, B. and Brinkman, G.L., 1989. *The returns to Canadian Federal Dairy Cattle Research: 1968-1984.* Working Paper WP89/20, Dept. of Ag. Econ. & Bus., Univ. of Guelph, Guelph, Oct. 1989.

Fox, G., Widmer, L. and Brinkman, G.L., 1989. *The economic returns to Canadian Federal Beef Cattle Research.* Beef Research Update, OAC publication #0289, J. Wilton (ed.), Univ. of Guelph, Guelph.

Howard, W.H., McEwan, K.A., Brinkman, G.L. and Christensen, J.M., 1989. *Human resource management on the farm: Attracting, keeping and motivating labour on Ontario swine farms.* Working Paper WP89/21, Dept. of Agr. Econ. and Bus., Univ. of Guelph, Guelph.

Oxley, J., Fox, G. and Moschini, G., 1989. *The potential economic impact of bovine somatotropin on the Ontario Dairy Industry.* Working Paper 89/1, Dept. of Ag. Econ. and Bus., Univ. of Guelph, Guelph, Jan.

MARKETING, TRADE AND AGRICULTURAL POLICY

PERIODICALS

Braga, F.S., Martin, L.J. and Meilke, K.D., 1989. "Cross hedging the Italian lira/US dollar exchange rate with deutsch mark futures." *J. Futures Markets.* Vol. 9(2). Pp. 87-100.

de Gorter, H. and Meilke, K.D., 1989. "Efficiency of alternative policies for the EC's common agricultural policy." *Amer. J. Agric. Econ.* Vol. 71(3). Pp. 592-603.

Goddard, E.W., 1989. "Effectiveness of Generic Advertising Programs in the Canadian Dairy Sector." *The Milk Producer*, October.

Goddard, E.W. and Amuah, A.K., 1989. "The Demand for Canadian Fats and Oils: A Case Study of Advertising Effectiveness." *Am. J. of Agr. Econ.* Vol. 71(3). Pp. 741-749.

Goddard, E.W. and Glance, S., 1989. "Demand for Fats and Oils in Canada, United States and Japan." *Cdn. J. or Agr. Econ.* Vol. 37(3). Pp. 421-444.

Meilke, K.D. and Warley, T.K., 1989. "Agriculture in the General Agreement on Tariffs and Trade (GATT)- Montreal, 1988 and after." *Highlights.* Vol. 12(2). Pp. 15-17.

Moschini, G. and Meilke, K.D., 1989. "Modeling the pattern of structural change in U.S. meat demand." *Amer. J. Agric. Econ.*, Vol. 71(2). Pp. 253-61.

PROCEEDINGS

Brinkman, G.L., 1989. "Canadian agriculture in the era of freer trade." *Proc., Appraisal Inst. of Canada Ann. Conf.*, Montreal, Quebec. Pp. 70-90.

Brinkman, G.L., 1989. "The business of agriculture in the 1990's." *Proc., Eastern Ont. Ec. Devl. Conf.*, Kingston, Min. of Ind., Trade & Comm.

Josling, T., Bredahl, M., Deaton, L., Meilke, K.D. and Tangermann, S., 1989. "Report of the task force on tariffication and rebalancing." *IATRC Working Paper 89/6*, Dept. of Ag. and Applied Ec., Univ. of Minnesota, Dec. Pp. 38.

MacGregor, R.J., Graham, J.D. and Meilke, K.D., 1989. "Multilateral Trade Liberalization: Determining the Regional Impact of Alternative National Policies." *Paper presented at a meeting of the Pacific Economic Co-operation Conf:* Ag. Policy, Trade.

Meilke, K.D., 1989. "Ontario Agriculture as it enters the 1990's." *Paper presented at Ont. Look-Ahead Conf.*, OMAF, Toronto, November 8.

BOOKS, THESES, REPORTS

Brinkman, G.L., 1989. *Farming opportunities and challenges in the 1990's.* Proc. Pioneer Agr. Outlook Conf., Kitchener, Chapter 2. Pp. 1-10.

Brinkman, G.L., 1989. *Structural change in Canadian agriculture in the 1980's.* Ag. Canada Policy Branch working paper, 118 Pp.

Kahn, L., 1989. *An assessment of the United States' export enhancement program for wheat.* M.Sc. (Thesis), Univ. of Guelph, Guelph, October.

Martin, P., 1989. *Effects of trade liberalization on less developed countries.* M.Sc. (Thesis), Univ. of Guelph, Guelph, May.

Meilke, K.D. and Larue, B., 1989. *An quantitative assessment of the impacts of trade liberalization on Canadian agriculture.* Agr. in Uruguay round of GATT neg.: impli. on Canada's and Ont's agrifood sys. AEB 89/6.

Moreau, M., 1989. *An economic forecasting model of feedgrain policy in the European Community.* M.Sc. (Thesis), Univ. of Guelph, Guelph, April.

Puttock, G.D., Prescott, D.M. and Meilke, K.D., 1989. *Stumpage prices in Southwestern Ontario: a hedonic function approach.* Working paper 89/5, Dept. of Ag. Economics and Bus., Univ. of Guelph, Guelph, March, 17 Pp.

Reynolds, A., McFaul, A. and Goddard, E.W., 1989. *Testing for Causality between Advertising Expenditures and the Demand for Dairy Products.* Dept. of Agr. Econ. & Bus., Working paper AEB WP90/04.

van Duren, E., 1989. *An economic analysis of countervailing duty law: cases involving agriculture.* Ph.D. (Thesis), Univ. of Guelph, Guelph, December.

van Duren, E. and Meilke, K.D., 1989. *An Economic approach to International Trade Law.* Select paper pres. at the AAEA annual meeting Baton Rouge, La., August.

UNIVERSITY OF GUELPH — ONTARIO VETERINARY COLLEGE

BIOMEDICAL SCIENCES

PERIODICALS

Atwal, O.S., Minhas, K.J. and Ferenczy, B., 1989. "Morphology of pulmonary intravascular macrophages (PIMs) in ruminants: Ultrastructural and cytochemical behaviour of dense surface coat." *Am. J. Anat.* Vol. 186. Pp. 285-299.

Barrett, D. and Summerlee, A.J.S., 1989. *Eu J Neurosci.* Vol. 2. "Lesion of the subfornical organ negates the relaxin-induced delay in birth in rats." Pp. S66.2., "Role of the subfornical organ in the timing of birth in rats." Pp. S66.1.

Betteridge, K.J., 1989. "Citation for the pioneer award of the international embryo transfer society (Charles Thibault, recipient of the 1989 embryo transfer pioneer award)." *Theriogenology.* Vol. 31. Pp. 1-2.

Bondy, G.S. and Gentry, P.A., 1989. "Characterization of the normal bovine platelet aggregation response." *Comp. Biochem. Physiol.* Vol. 92. Pp. 67-72.

Bondy, G.S., Gentry, P.A. and Basrur, P.K., 1989. "Structure function relationship of the action of T-2 toxin on bovine platelets." *Fund. Appl. Toxicol. Vol. 12.* Pp. 109-118.

Bondy, G.S., Holub, B.J. and Gentry, P.A., 1989. "Effects of T-2 toxin on platelet activating factor dependent phosphoinositide turnover in the bovine platelets." *Toxicol. in Vitro.* Vol. 3. Pp. 175-179.

Brown, W.R. and Hardy, M.H., 1989. "Mast cells in asebia mouse skin." *J. Invest.* Dermatol Vol. 93. Pp. 708.

Clark, D.A., Banwatt, D.K., Manuel, J., Fulop, G. and Croy, B.A., 1989. "SCID mice in reproductive biology." *Contem. Topics in Immunol.* Vol. 152. Pp. 227-234.

Co:ucci, P.E., MacLeod, G.K., Grovum, W.L., McMillan, I. and Barney, D.J., 1989. "Digesta kinetics in sheep and cattle fed diets with different forage to concentrate ratios at high and low intakes." *J. of Dairy Sci.*

Crepeau, M., Yamashiro, S. and Croy, B.A., 1989. "Morphological demonstration of failure of Mus caroli trophoblast in the Mus musculus uterus." *J. Reprod. Fert.* Vol. 86. Pp. 277-288.

Croy, B.A. and Kassouf, S., 1989. "Evaluation of the murine metrial gland for immunological function." *J. Reprod. Immunol.* Vol. 15. Pp. 51-70.

Frautschy, S.A. Gaon, D. and Liptrap, R.M., 1989. "Effect of dexamethasone on gonadotrophin secretion in the gonadectomized sow and boar." *Can. J. Vet. Res.* Vol. 53. Pp. 490-492.

Gaon, D. and Liptrap, R.M., 1989. "Effect of dexamethasone on secretion of luteinizing hormone and testosterone in the boar." *Theriogenology.* Vol. 32. Pp. 79-85.

Gentry, P.A., Tremblay, R.R.M. and Ross, M.L., 1989. "Failure of aspirin to impair bovine platelet function." *Amer. J. Vet. Res.* Vol. 50. Pp. 919-922.

Gentry, P.A., Riemiller, C., Ross, M.L. and Liptrap, R.M., 1989. "Platelet aggregation in the Asian elephant is not dependent or thromboxane B2 production." *Comp. Biochem. Physiol.* Vol. 94. Pp. 47-51.

Hardy, M.H., 1989. "The use of retinoids as probes for analysing morphogenesis of glands from epithelial tissues." *In Vitro, Cell & Dev. Biol.* Vol. 25. Pp. 454-459.

Harris, W.H., Dowd, K. and Brlanger, A., 1989. "Effects of Pasteurella haemolytica cytotoxin on bovine airway smooth muscle." *Can,. Fed. Biol. Societies.* Vol. 32. Pp. 088.

Hobkirk, R., Renaud, R. and Raeside, J.I., 1989. "Partial characterization of steroid sulfohydrolase and steroid sulfotransferase activities in purified porcine Leydig cells." *J. Steroid Biochem.* Vol. 32. Pp. 387-392.

Johnstone, I.B., Physick-Sheard, P. and Crane, S., 1989. "Breed, age and gender differences in plasma antithrombin III activity in clinically normal young horses." *Am. J. Vet. Res.* Vol. 50. Pp. 1751-1753.

Kelly, J., Munholland, J. and Wildeman, A., 1989. "Co-measurement of simian virus early and late promoter activity in the presence of T antigen." *J. Virology.* Vol. 63. Pp. 383-391.

King, W.A., Chartrain, I., Kopecny, V., Betteridge, K.J. and, Bergeron, H., 1989. "Nucleolus organizer regions and nucleoli in mammalian embryos." *J. Reprod. Fert.* Suppl. Vol. 38. Pp. 63-71.

Kupsh, C.C. and Robinson, G.A., 1989. "Linearity of the accumulation of various dosages of uranium in the major organs of mature male Japanese quail. Effects of Estradiol-17 beta." *Comp. Biochem. Physiol.* Vol. 92C. Pp. 55-59.

Liptrap, R.M., Cummings, E. and Huether, P., 1989. "Effect of mid-luteal glucocorticoid injection with pulsatile administration of gonadotrophin releasing hormone on follicular growth and ovulation in the sow." *Anim. Rp, rod. Sci.* Vol. 19. Pp. 131-141.

Mukhtar, D.D.Y., Stewart, I.J. and Croy, B.A., 1989. "Leucocyte membrane antigens on mouse granulated metrial gland cells." *J. Reprod. Immunol.* Vol. 15. Pp. 269-279.

Mumford, A.D., Summerlee, A.J.S., 1989. *Eu J Neurosci* Vol. 2. Pp. S14.6. "Lesions of the subfornical organ affect the pressor affect of centrally administered relaxin in anaesthetized rats.", "Porcine relaxin suppresses release of LH in rats."

Mumford, A.D., Parry, L.J. and Summerlee A.J.S., 1989. "Central angiotensin II blockade suppresses the effect of centrally administered relaxin in anaesthetised rats." *Eu J Neurosci* Vol. 2. Pp. S66.3.

Mumford, A.D., Parry, L.J. and Summerlee, A.J.S., 1989. "Lesion of the subfornical organ affects the haemotensive response to centrally administered relaxin in anaesthetized rats." *J Endocr* Vol. 122. Pp. 747-755.

Parry, L.J., Poterski, R.S. and Summerlee, A.J.S., 1989. "The pressor response to relaxin in anaesthetized rats changes with stage of pregnancy and location." *Can. J. Physiol.* Pharm.

Parry, L.J., Summerlee, A.J.S. and Mumford, A.D., 1989. "Role of the central angiotensin system in the pressor action of relaxin in anaesthetized rats." *J. Neuroendocr.*

Peter, A.T., Bosu, W.T.K., Liptrap, R.M. and Cummings, E., 1989. "Temporal changes in serum prostaglandin F2 alpha and oxytocin in dairy cows with short luteal phases after the first postpartum ovulation." *Theriogenology.* Vol. 32. Pp. 277-283.

Pollard, J.W., Xu, K.P., Rorie, R., King, W.A. and, Betteridge, K.J., 1989. "Influence of various oviductal epithelial cell culture systems on the development of early cleavage stage bovine embryos in vitro." *Theriogenology.* Vol. 3. Pp. 239.

Raeside, J.I., Renaud, R.L. and Friendship, R.M., 1989. "Aromatization of 19-norandrogens by porcine Leydig cells." *J. Steroid Biochem.* Vol. 32. Pp. 729-735.

Raeside, J.I., Renaud, R.L. and Friendship, R.M., 1989. "Isolation of 11 beta-hydroxylated androgens from testicular vein blood of the mature boar." *Biochem. Biophys. Res. Commun.* Vol. 162. Pp. 1194-1199.

Rieger, D., Roberge, S., Coy, D.H. and Rawlings, N.C., 1989. "The effects of an LHRH antagonist on gonadotrophin and oestradiol secretion, follicular development, oestrus, and ovulation in Holstein heifers." *J. Reprod. Fert.* Vol. 86. Pp. 157-164.

Rozon, D.K., Harris, W.H. and Gibbins, A.M.V., 1989. "Uncoupling protein and its mRNA in brown adipose tissue of newborn rabbits." *Can. J. Physiol. Pharmacol.* Vol. 67. Pp. 54-58.

Wildeman, A., 1989. "Transactivation of both early and late simian virus 40 promoters by T antigen does not require nuclear localization of the protein." *Proc. Natl. Acad. Sci.*, U.S.A. Vol. 86. Pp. 21123-2127.

Yamashiro, S., Bast, T. and Croy, B.A., 1989. "Failure of the beige genotype to alter the morphology of uterine granulated metrial gland cells." *Proc. Electron Microscopy Society of America* Vol. 47. Pp. 908-909.

PROCEEDINGS

Atwal, O.S., Yuill, C. and Minhas, K.J., 1989. "Ultrastructural and cytochemical properties of the surface coat of pulmonary intravascular macrophages (PIMs) of ruminant lung: Effects of drugs and metal ions." *70th Conference of Research Workers in Animal Diseases*, Chicago.

Betteridge, K.J., 1989. "Citation for the Pioneer Award of the International Embryo Transfer Society (Charles Georges Thibault, recipient of the 1989 Enbryo Transfer Pioneer Award)." *Theriogenoloy.* Vol. 31. Pp. 1-2.

Betteridge, K.J., 1989. "Embryo transfer and animal production in a biotechnological age." *International Forum on Animal Reproduction*, Bilbao, Spain.

Betteridge, K.J., King, W.A. and Rieger, D., 1989. "Bovine embryo development from conception to collection." *Proc. 8th Ann. Mtg. Amer. Emb. Transf. Assoc.*, Nashville.

Betteridge, K.J., Smith, C., Stubbings, R.B., Xu, K.P. and, King, W.A., 1989. "Potential genetic improvement of cattle by in vitro fertilization of fetal oocytes." *J. Reprod. Fert.* Suppl. Vol. 38. Pp. 87-98.

Black, W.D. and Ferguson, H., 1989. "Pharmacokinetic study of oxytetracycline in rainbow trout." *Conference of Research Workers in Animal Disease*, Chicago, Illinois.

Clark, D.A., Fulop, G.M. and Croy, B.A., 1989. "SCID mice in reproductive biology." *EMBO Worksbop on the SCID mutant*, Basel.

Croy, B.A., Stinchcomb, D., Gough, N.M. and Guilbert, L.J., 1989. "Cytokine production is a function of murine uterine granulated metrial gland (GMG) cells." *Cytokines* 1. Pp. 102.

De Jong, C.G., Gentry, P.A. and Basrur, P.K., 1989. "Functional and morphological stability of the bovine platelet." *Can. Fed. Biol. Soc.* Vol. 32. Pp. 137.

Grandoni, K.M., Holub, B.J. and Gentry, P.A., 1989. "The inhibitory effects of trichothecene mycotoxins on phospholipid turnover in stimulated bovine platelets." *Can. Fed. Biol. Soc.* Vol. 32. Pp. 86.

Halbert, G.W., Leslie, K.E., Walton, J.S. and Betteridge, K.J., 1989. "Evaluation of return to estrus in superovulated dairy heifers following prostaglandin treatment." *Theriogenology.* Vol. 31. Pp. 201.

King, W.A., 1989. "Embryonic mortality in cattle." *International Forum on Animal Reproduction*, Bilbao, Spain.

King, W.A., Chartrain, I., Kopecny, V., Betteridge, K.J. and Bergeron, H., 1989. "Nucleolus organizer regions and nucleoli in mammalian embryos." *J. Reprod. Fert. Suppl.* Vol. 38. Pp. 63-71.

Munholland, J.M. and Wildeman, A., 1989. "Transactivation of viral late gene transcription by SV40 and polyoma virus T antigens is seen only in permissive cell types." *East-Canadian Conference on Development and Cancer*, Quebec.

Munholland, J.M., Kelly, J., Hassell, J. and Wildeman, A., 1989. "SV40 and polyoma virus tumour antigens activate each other's late genes in permissive cells." *Cold Spring Harbor Meeting on Cancer Cells*, Cold Spring Harbor.

Munholland, J.M., Kelly, J., Hassell, J. and Wildeman, A., 1989. "SV40 and polyoma virus tumour antigens activate each other's late genes in permissive cells." *Imperial Cancer Research Fund Meeting on DNA tumour viruses.*

Pollard, J.W., Xu, K.P., Rorie, R.W., King, W.A. and, Betteridge, K.J., 1989. "Influence of various oviductal epithelial cell culture systems on the development of early cleavage stage bovine embryos in vitro." *Theriogenology.* Vol. 31. Pp. 239.

Pollard, J.W., Plante, C., King, W.A., Hansen, P., Suarez, S. and Betteridge, K.J., 1989. "Sperm fertilizing capacity is maintained by binding to oviductal epithelial cells." *Proc. Serono Symp. on Fert. in Mammals*, Boston. Pp. 61.

Pontbriand, D., Goff, A.K., Xu, K.P. and King, W.A., 1989. "Effect of steroids on protein synthesis in mature and immature bovine oocytes." *Theriogenology*. Vol. 31. Pp. 240.

Raeside, J.I., Renaud, R.L., Friendship, R.M. and Khalil, M.W., 1989. "Porcine testes release C19 and C18 neutral steroid intermediates of estrogen biosynthesis." *J. Reprod. Fert. Abstr. Ser.* No. 3. Pp. 79.

Rieger, D. and Betteridge, K.J., 1989. "Principles and practice of embryo culture." Proc. 8th Ann. *Mtg. Amer. Emb. Transf. Assoc.*, Nashville.

Rieger, D., Palmer, E., Lagneau-Petit, D. and Tiffin, G., 1989. "Simultaneous measurement of the metabolism of two energy substrates in individual horse and cow embryos." *Theriogenology*. Vol. 31. Pp. 249.

Rorie, R.W., Pool, S.H., Prichard, J.F., Betteridge, K.J. and Godke, R.A., 1989. "Production of chimeric blastocysts comprising sheep ICM and goat trophoblast cells for intergeneric transfer." *J. Anim. Sci.* Suppl. 1.

Rumbeiha, W.K. and Bhatnagar, M.K., 1989. "Effects of combined treatment with methyl mercury and ethanol on renal metallothionein and mercury residues in the rat." *Society of Toxicology of Canada Meeting*, Montreal.

Stirtzinger, T., Johnson, R.P. and Croy, B.A., 1989. "Successful engraftment of bovine lymphocyes in mice of genotype scid/scid.bg/bg." *EMBO Workshop on the SCID mutant.*

van Vliet, R.A., Gibbins, A.M., Goodwin, M.L., Betteridge, K.J., Wildeman, A.G. and Walton, J.S., 1989. "Detection of messenger RNA for beta-actin and oxytocin in bovine conceptuses on day 18 of gestation." *Biol. Reprod.* Vol. 40. Suppl. 1. Abstr. 51

Xu, K.P., Picard, L., King, W.A. and Goff, A.K., 1989. "Sexing and bisecting bovine embryos produced by in vitro maturation and fertilization." *Theriogenology*. Vol. 31. Pp. 247.

BOOKS, THESES, REPORTS

Betteridge, K.J., 1989. *Livestock embryo sexing: past, present and future*. Evolutionary Mechanisms in Sex Determination. Ed. S.S. Wachtel, CRC Press, Boca Raton, FL.

Bondy, G.S., Gentry, P.A. and Basrur, P.K., 1989. *Structure function relationship of the action of T-2 toxin on bovine platelets*. Fund. Appl. Toxicol. Vol. 12. Pp. 109-118.

Bondy, G.S., Holub, B.J. and Gentry, P.A., 1989. *Effects of T-2 toxin on platelet activating factor dependent phosphoinositide turnover in the bovine platelets*. Toxicol. in Vitro. Vol. 3. Pp. 175-179.

Croy, B.A., Chapeau, C., Reed, N., Stewart, I.J. and, Peel, S., 1989. *Is there an essential requirement for bone marrow-derived cells at the fetomaternal interface during successful pregnancy?* Molecular and Cellular Biology of the Fetomaternal Interface.

De Jong, C.G., 1989. *Functional and morphologic stability of the bovine platelet*. M.Sc. (Thesis) University of Guelph, Guelph.

Gentry, P.A., 1989. *Effects on hemostasis and red cell production*. Trichothecene Mycotoxicosis. Vol. II. ed. V.R. Beasley, CRC Press.

Grandoni, K.M., 1989. *The comparative effects of trichothecene mycotoxins on phospholipid turnover and aggregation in the bovine platelet*. M.Sc. (Thesis) University of Guelph, Guelph.

Hardy, M.H., 1989. *Report on histological studies of marine mammal tissues*. Department of Fisheries and Oceans.

Picard, L. and Betteridge, K.J., 1989. *The micromanipulation of farm animal embryos*. Comprehensive Biotechnology. 1st Suppl. Vol. 1 (Animal Biotechnology). Eds L.A.

Rumbeiha, W.K. and Bhatnagar, M.K., 1989. *Effects of combined treatment with methyl mercury and ethanol on renal metallothionein and mercury residues in the rat*. Presented at the Soc. of Toxicology of Can. Mtg., Montreal, Nov.

Stirtzinger, T., Johnson, R.P. and Croy, B.A., 1989. *Successful engraftment of bovine lymphocyes in mice of genotype scid/scid.bg/bg*. EMBO Workshop on the SCID mutant, Basel.

Tiffin, G.J., 1989. *The activity of glucose-6-phosphate dehydrogenase and its relationship to the sex of pre-attachment bovine embryos*. M.Sc. (Thesis) University of Guelph, Guelph.

PATHOLOGY

PERIODICALS

Backman, S. and Speare, D., 1989. "Atypical columnaries disease of trout." *Can. Vet. J.* Vol. 30. Pp. 434.

Britton, A.P., Miller, R.B., Ruhnke, H.L. and Johnson, W.H., 1989. "Protein A gold identification of Ureaplasmas on the bovine zona pellucida." *Can. J. Vet. Res.* Vol. 53. Pp. 172-175.

Byrne, P., Speare, D. and Ferguson, H.W., 1989. "Effects of a cationic detergent on the gills and blood chemistery of rainbow trout Salmo gairdneri." *Dis. Aquat. Orgs.* Vol. 6. Pp. 185-196.

Julian, R.J., 1989. "Ascitis causa por sindrome de hypertension pulmonar." *XI Congreso Latinoamericano de Avicultura*, San Jose, Costa Rica.

Julian, R.J., 1989. "Lung volume of meat-type chickens." *Avian Dis.* Vol. 33. Pp. 174-176.

Julian, R.J., 1989. "Pulmonary hypertension causing right heart failure and ascites (waterbelly) in meat-type chickens." *Proc. 24th Nat. Meeting on Poultry Health and Condemnations*, Ocean City, Maryland.

Julian, R.J., 1989. "Pulmonary hypertension in meat-type chickens caused by high dietary sodium." *Proc. 61st NECAD*. Blacksberg, Virginia.

Julian, R.J., 1989. "Pulmonary hypertension syndrome and ascites in meat-type chickens." *Proc. 38th Western Poultry Disease Conference* Temp, Ar.

Julian, R.J., Frazier, J.A. and Goryo, M., 1989. "Right ventricular hypertrophy right ventricular failure and ascites in broiler chickens caused by amiodarone-induced lung pathology." *Avian Path.* Vol. 18. Pp. 161-174.

Julian, R.J., McMillan, I. and Quinton, M., 1989. "The effect of cold and dietary energy on right ventricular hypertrophy, right ventricular failure and ascites in meat-type chickens." *Avian Path.* Vol. 18. Pp. 675-684.

Kalow, B.I. and O'Brien, P.J., 1989. "Canine stress syndrome." *Can. Vet. J.* Vol. 30. Pp. 595.

Mirsalimi, S.M., Qureshi, S., Julian, R.J. and O'Brien, P.J., 1989. "Myocardial biochemical changes in furazolidone-induced cardiomyopathy in turkeys." *FASEB 73rd Annual Meeting*, New Orleans, Louisiana.

O'Brien, P.J., 1989. *J. Molec Cell Biochem.* In press. "Calcium sequestration by isolated sarcoplasmic reticulum: real-time monitoring using ratiometric dual-emission spectrofluorometry and the fluorescent calcium-binding dye", "Microcassay for malignant hyperthermia suseptibility: hypersensitive ligand-gating of the Ca channel in muscle sarcoplasmic reticulum causes increased amounts and rates of."

O'Brien, P.J., 1989. "Canaine malignant hyperthermia / canine stress syndrome." *Membrane Linked Diseases*. Vol. 3. In press.

O'Brien, P.J., Kalow, B.I., Brown, B.D., Lumsden, J.H and, Jacobs, R.M., 1989. "Porcine malignant hyperthermia suseptasbility: halithane-induced increase in cytoplasmic free cacium of peripheral blood lymphocyjes." *Am. J. Vet. Res.* Vol. 50. Pp. 131-135.

O'Brien, P.J., Klip, A., Britt, B.A. and Kalow, B.I., 1989. "Malignant hyperthermia suseptibility: biochemical basis for pathogenesis and diagnosis." *Can. J. Vet. Res.* In press.

O'Brien, P.J., Pook, H.A., Klip, A., Britt, B.A.,, McLaughlin, R.N., Scott, E. and Elliot, M.E., 1989. "Canine stress syndrom / malignant hyperthermia suseptability: calcium homiostasis defect in lymhocytes and muscle." *Res. Vet. Sci.* In press.

Ostland, V.E., Stevenson, R. and Ferguson, H.W., 1989. "Case Report: bacterial gill disease in goldfish Carassias auratus." *Dis. Aquat. Orgs.* Vol. 6. Pp. 179-184.

Percy, D.H., Bond, S.J. and MacInnes, J.I., 1989. "Replication of sialodacryoadenitis virus in mouse L-2 cells." *Arcb Virol* Vol. 104. Pp. 323-333.

Percy, D.H., Wojcinski, Z.W. and Schunk, M.K., 1989. "Sequential changes in Harderian and exorbital lacrimal glands in Wistar rats infected with sialodacryoadenitis virus." *Vet Path* Vol. 26. Pp. 238-245.

Speare, D.J. and Ferguson, H.W., 1989. "Clinical features of bacterial gill disease of salmonids in Ontario." *Can. Vet. J.* Vol. 30. Pp. 882-887.

Speare, D.J., Brackett, J. and Ferguson, H.W., 1989. "Sequencial pathology of the gills of Coho salmon with a combined diatom and microsporidian gill infection." *Can. Vet. J.* Vol. 30. Pp. 571-575.

Wollenberg, G.K., Harris, L., Faber, E. and Hayes, M.A., 1989. "Inverse relationship between epidermal growth factor induced proliferation and expression of high affinity surface epidermal growth factor receptors in rat hepatocytes." *Lab. Investig.* Vol. 60. Pp. 254-259.

PROCEEDINGS

Slocombe, O., 1989. *Proc. of tbe 13tb. Conf. of tbe World Assoc. for tbe Advancement of Vet. Parasitology.* "Strategic control of stronglyles in ponies with oxfendazole in Ontario.", "Strategic control of stronglyles with ivermectin on a thoroughbred stud farm in Ontario."

Slocombe, O., 1989. "Strategic control of stronglyles with ivermectin in mature horses in Ontario." *Proc. of tbe 34tb. An. Mtg. of tbe Am. Assoc. of Vet. Parasitologists.* Pp 26. Orlando, Fl.

Speare, D. and Ferguson, H.W., 1989. "Fixation artifacts in rainbow trout (Salmo gairdneri) gills: a morphometric evaluation." *Can. J. Fisb. Aquat. Sci.* Vol. 46. Pp. 780-785.

Yager, J.A., Caswell, J.L., Hunter, D.B. and Hayes, M.A., 1989. "The cervical apocrine gland of neonatal mink: the effects of in utero exposure to polychlorinated biphenyls on glandular development." *1st World Congress on Veterinary Dermatology Dijon*, France.

BOOKS, THESES, REPORTS

Black, W.D. and Ferguson, H.W., 1989. *Pharmacokinetic study of oxytetracycline in rainbow trout.* 70th. Conf. Res. Work. in Animal Sci., Chicago, Michigan.

Ferguson, H.W., 1989. *Systemic Pathology of Fish: A text and atlas of comparative tissue responses in diseases of teleosts.* Iowa State Univ. Press, Ames.

Julian, R.J., 1989. *Ascites in meat-type chickens caused by right heart failure. Flip-over disease (sudden death syndrome) in meat-type chickens.* Ontario Ministry of Agriculture and Food Factsheet.

Smith, I.R, Baker, K.W., Hayes, M.A. and Freguson, H.W., 1989. *Ultrastructure of malpighian and inflammatory cells in epidermal papillomas of white suckers (Catostomus commersoni).* Disease of Aquatic Organisms. Vol. 16. Pp. 17-26.

VETERINARY MICROBIOLOGY AND IMMUNOLOGY

PERIODICALS

Gannon, V.P.J., Gyles, C.L. and Wilcock, B.P., 1989. "Effects of Shiga-like toxins (verotoxins) in pigs." *Can. J. Vet.* Res. Vol. 53. Pp. 306-312.

Menzies, P.I. and Muckle, C.A., 1989. "The use of a microagglutination assay for the detection of antibodies to Corynebacterium pseudotuberculosis in naturally infected sheep and goat flocks." *Can. J. Vet.* Res. Vol. 53. Pp. 313-318.

Prescott, J.F., Machangu, R., Kwiecien, J. and Delaney, K., 1989. "Prevention of foal mortality due to Rhodococcus equi pneumonia on an endemically affected farm." *Can. Vet. J.* Vol. 30. Pp. 871-875.

PROCEEDINGS

Nemeth, J. and Muckle, C.A., 1989. "Relationship of the traT protein to serum resistance and antimicrobial resistance in bovine mastitis and environmental Escherichia coli isolates." Abstracts of the *89th Ann. Mtg. of tbe Am. Soc. for Microbiology D209.*

BOOKS, THESES, REPORTS

Baker, T.F., McEwen, S.A., Prescott, J.F. and Meek, A.H., 1989. *The prevalence of leptospirosis and its association with multifocal interstitial nepbritis in swine at slaugbter.* Can. J. Vet. Res. Vol. 53. Pp. 290-294.

Bort, J.D., 1989. *Analysis of Actinobacillus pleuropneumoniae and related organisms by DNA-DNA bybridization and restriction endonuclease fingerprinting.* M.Sc. (Thesis). Univ. of Guelph, Guelph.

Clarke, R.C., McEwen, S.A., Gannon, V.P., Lior, H. and Gyles, C.L., 1989. *Isolation of verocytotoxin-producing Escberichia coli from milk filters in south-western Ontario.* Epidem. Inf. Vol. 102. Pp. 253-260.

Clarke, R.C., Rahn, K., MacKenzie, C., DeGrandis, S., Gutel, R., Lior, H., Lynch, J., Schoonerwoerd, M. and, Gyles, C., 1989. *Characteristics of verocytotoxin-producing Escherichia coli recovered from raw milk, ground beef, and cattle in Canada.* ASM Ann. Gen. Mtg. New Orleans, Lou. Pp 52.

DeGrandis, S.A., Brunton, J., Gyles, C. and Lingwood, C.A., 1989. *Globotetraosyl ceramide is recognized by tbe pig edema disease toxin.* J. Biol. Chem Vol. 264. Pp. 12525.

Lian, C.J., Rosendal, S. and MacInnes, J.I., 1989. *Molecular cloning and characterization of a bemolysin gene from Actinobacillus (Haemopbilus) pleuropneumoniae. Infect. Immun.* Vol. 57. Pp. 3377-3382.

MacLeod, D.L. and Gyles, C.L., 1989. *Effects of culture conditions on yield of Sbiga-like toxin-IIv from Escberichia coli.* Can. J. Microbiol. Vol. 35. Pp. 623-629.

Majury, A.L., 1989. *Pasteurella Haemolytica ST1 Leukotoxin and bovine lymphocyte proliferation.* M.Sc. (Thesis). University of Guelph. Guelph.

Mallard, B.A., Wilkie, B.N. and Kennedy, B.W., 1989. *Genetic and other effects of antibody and cell-mediated immune response in Swine Leukocyte Antigen (SLA)-defined miniature pigs.* Animal Genetics Vol. 20. Pp. 167-178.

Mallard, B.A., Wilkie, B.N. and Kennedy, B.W., 1989. *Influenced of major histocompatibility genes on serum hemolytic complement activity in miniature swine.* Am. J. Vet. Res. Vol. 50. Pp. 359-363.

Mallard, B.A., Wilkie, B.N. and Kennedy, B.W., 1989. *The influence of swine major histocompatibility genes(SLA) on variation in Serum Immunoglobulin(Ig) concentration.* Vet. Immunol. Immunopathol. Vol. 21. Pp. 139-151.

Mondesire, R.R., Maclean, I.W., Shewen, P.E. and Winston, S.E., 1989. *Identification of genus-specific eptopes on the outer membrane of complexes of Chlamydia trachomatis and Chlamydia psittaci immunotypes 1 and 2.* Infect. immun. Vol. 57. Pp. 2914-2918.

Nagy, E., Derbyshire, J.B. and Krell, P.J., 1989. *Analysis of HN from NDV in a baculovirus recombinant.* Proc. 70th Ann. Mtg. Conf. Res. Workers Anim. Dis. Pp. 45.

Stear, M.J., Mallard, B.A., Newman, M.J. and Wilkie, B.W., 1989. *The current status of the major histocompatibility system: definition in cattle, goats, horses, pigs and sheep.* Int. J. Anim. Sci. Vol. 4. Pp. 32-48.

CLINICAL STUDIES

PERIODICALS

Viel, L., Willoughby, R.A. and Carman, S., 1989. "Standard Breeders and Owner Assoc., Ont. December." *Can. Vet. J.*

PROCEEDING

Hoffman, A.M., Staempfli, H.R., Viel, L., Prescott, J.F. and Waltner-Toews, D., 1989. "Field evaluation of a commercial M-protein vaccine (Strepvax II) in a feedlot for fouls with epidemic strangles." *Proc. of the 7th Ann. Vet. Med. Forum.* Ont. Vet. College, Univ. of Guelph, Guelph.

BOOKS, THESES, REPORTS

Hurtig, M. and Desjardins, M., 1989. *Incorporation of fresh and cryopeserved bone in osteochondral autographs., Hetertopic transfer of fresh and cryopreserved osteochondral autografts in the horse.* Dr. Desjardins' Theses, submitted, Univ. of Guelph, Guelph.

Tesarowski, D.B., Viel, L. and McDonell, W.N., 1989. *Analysis of flow-volume loops and arterial blood gases during inhalation of 8, 10 and 12% CO2/ air mixtures in horses.* Proc. Comp. Resp. Soc. VIII.

Tesarowski, D.B., Viel, L. and McDonell, W.N., 1989. *Evaluation of flow-volume loops during inhalation of 8, 10 and 12% CO2 in horses.* The Physiologist. Vol. 32. Pp. 159.

POPULATION MEDICINE

PROCEEDINGS

Alves, D.M., McDermott, J.J., Anderson, N.G. and Martin, S.W., 1989. "Health productivity and management of calves on Ontario beef cow-calf herds." *Proc. 21st Am. Assoc. Bov. Pract.* Pp. 135-138.

Anderson, N.G., McDermott, J.J., Alves, D.M. and Martin, S.W., 1989. *Proc. 21st Am. Assoc. Bov. Pract.* "1986-1987 performance of replacement beef heifers in Ontario cowcalf herds." Pp. 139-142. "Health and productivity of beef breeding herds in Southern Ontario." Pp. 131-134.

Martin, S.W., McDermott, J.J., Alves, D.M. and Anderson, N.G., 1989. "Benchmark: A beef cow-calf production and health monitoring system." *Proc. 5th Int. Sym. Vet. Epidemiol Econ, Copenbagen.* Acta. Vet. Scan. Supp. 84. Pp. 231.

McDermott, S.W., Lesnick, T.G. and Martin, S.W., 1989. "The analysis of individual animal risk for animals sampled in clusters." *Proc. 5th Int. Sym. Vet. Epidemiol. Econ., Copenbagen. Acta. Vet. Scan.* Supp. 84. Pp. 459.

BOOKS, THESES, REPORTS

Gartley, C.J., 1989. *Lamb production from the transfer of embryos bisected following cryopreservation.* DVSc Thesis.

McMorris, M. and Wilton, J.W., 1989. *Influence of performance testing on the reproductive performance of beef bulls.* Survey results, OMAF extension notes for veterinarians #378.

FISH PRODUCTION

PERIODICALS

Armstrong, R.D. and Ferguson, H.W., 1989. "Systemic viral disease of the chromide cichild, Etroplusmaculatus Bloch." *Dis. Aquat. Orgs.* Vol. 7. Pp. 155-157.

Armstrong, R.D., Evelyn, T.P.T., Martin, S.W., Dorward, W. and Ferguson, H.W., 1989. "Erythromycin levels within eggs and alevins derived from spawning broodstock chinook salmon (Oncorhynchus tshawytscha) injected with the drug." *Dis. Aquat. Orgs.* Vol. 6. Pp. 33-36.

Backman, S. and Speare, D., 1989. "Atypical columnaris disease of trout." *Can. Vet. J.* Vol. 30. Pp. 434.

Bryne, P., Speare, D. and Ferguson, H.W., 1989. "Effects of a cationic detergent on the gills and blood chemistry of rainbow trout Salmo gairdneri." *Dis. Aquat. Orgs.* Vol. 6. Pp. 185-196.

Chisholm, P.S. and Farrell, J.B., 1989. "Waste production, land based rainbow trout culture." *American Society of Agricultural Engineers Winter Meeting,* New Orleans. Paper 897526.

Farrell, J.B. and Chisholm, P.S., 1989. "Modelling waste production rainbow trout culture." *Canadian Society of Agriculture Engineering Poster Show,* Guelph.

Ferguson, H.W., Ostland, V.E., Stevenson, R. and Daly, J., 1989. "Visceral necrosis of goldfish — a new bacterial disease." *J. Fish Dis.* Vol. 12. Pp. 249-256.

Johnston, W.L., MacDonald, E. and Hilton, J.W., 1989. "Relationships between dietary ascorbic status and deficiency, weight gain and brain neurotransmitter levels in juvenile rainbow trout, Salmo gairdneri." *Fish Physiol. Biochem.* Vol. 6. Pp. 353-365.

Kirby, G.M., Smith, I.R. and Hayes, M.A., 1989. "Biliary excretion of benzo(a)pyrene in benthic fish from industrially-polluted and reference sites in the Great Lakes." *The Toxicologist.* Vol. 9. Pp. 163.

Ostland, V.E., Stevenson, R. and Ferguson, H.W., 1989. "Case report: bacterial gill disease in goldfish Carassias auratus." *Dis. Aquat. Orgs.* Vol. 6. Pp. 179-184.

Quinn, B.A., Crane, T.L., Kirby, G.M., Pollanen, M.S. and, Hayes, M.A., 1989. "Affinity of hepatic glutathione S-transferases for DNA-binding metabolites of aflatoxin B1." *The Toxicologist.* Vol 9. Pp. 354.

Ratpan, M. and Hayes, M.A., 1989. "Chronic dermal carcinogenicity bioassay of oil extended rubbers." *Proc. Europ. Rubber Industry Conference.* Rubber Tech.

Smith, I.R., Baker, K.W., Hayes, M.A. and Ferguson, H.W., 1989. "Ultrastructure of malpighian and inflammatory cells in

epidermal papillomas of white suckers (Catostomus commersoni)." *Diseases of Aquatic Organisms* Vol. 16. Pp. 17-26.

Speare, D.J. and Ferguson, H.W., 1989. "Fixation artifacts in rainbow trout (Salmo gairdneri) gills: a morphometric evaluation." *Can. J. Fish. Aquat. Sci.* Vol. 46. Pp. 78-785.

Speare, D.J. and Ferguson, H.W., 1989. "Clinical features of bacterial gill disease of salmonids in Ontario." *Can. Vet. J.* Vol. 30. Pp. 882-887.

Speare, D.J., Brackett, J. and Ferguson, H.W., 1989. "Sequential pathology of the gills of Coho salmon with a combined diatom and microsporidian gill infection." *Can. Vet. J.* Vol. 30. Pp. 571-575.

Wollenberg, G.K., Harris, L. Farber, E. and Hayes, M.A., 1989. "Inverse relationship between epidermal growth factor induced proliferation and expression of high affinity surface epidermal growth factor receptors in rat hepatocytes." *Lab Investig.* Vol. 60. Pp. 254-259.

PROCEEDINGS

Black, W.D. and Ferguson, H.W., 1989. "Pharmacokinetic study of oxytetracycline in rainbow trout." *70th Conf. Res. Work in Animal Science*, Chicago, Michigan.

Chisholm, P.S. and Farrell, J.B., 1989. "Fish waste production rainbow trout culture." *Technology Transfer Conference.* Volume II. Environment Ontario. Pp. 130-134.

Choo, P.S., Smith, T.K. and Cho, C.Y., 1989. "Demonstration of leucine toxicity in the rainbow trout." *Proc. Ann. Mtg. Can. Soc. nim. Sci.* Montreal, Quebec.

Kirby, G.M., Smith, I.R., Bend, J.R., Ferguson, H.W. and, Hayes, M.A., 1989. "Hepatic metabolism of benzo(a)pyrene in white suckers (Catostomus commersoni) from polluted sites in the Great Lakes: Role of glutathione S-transferase." *Technology Transfer Conference*, Environment Ontario, Toronto.

BOOKS, THESES, REPORTS

Ferguson, H.W., 1989. *Systemic pathology of fish: A text and atlas of comparative tissue responses in diseases of teleosts.* Iowa State University Press, Ames.

Hayes, M.A. and Ferguson, H.W., 1989. *Neoplasms in fish.* Systemic Pathology of Fish. H.W. Ferguson, Iowa State University Press.

Hayes, M.A., Smith, I.R., Crane, T.L., Rushmore, T.H., Kocal, T.E. and Ferguson, H.W., 1989. *Pathogenesis of skin and liver neoplasms in white suckers (Catostomus commersoni) from industrially polluted sites in Lake Ontario.* Science of the Total Environment, Special Issue *Chemical Contaminants and and Fish Tumors.*